OLOGY DEPT.

A PICTORIAL SURVEY OF CURRENT PRACTICE, EQUIPMENT AND MATERIALS

Construction Methods

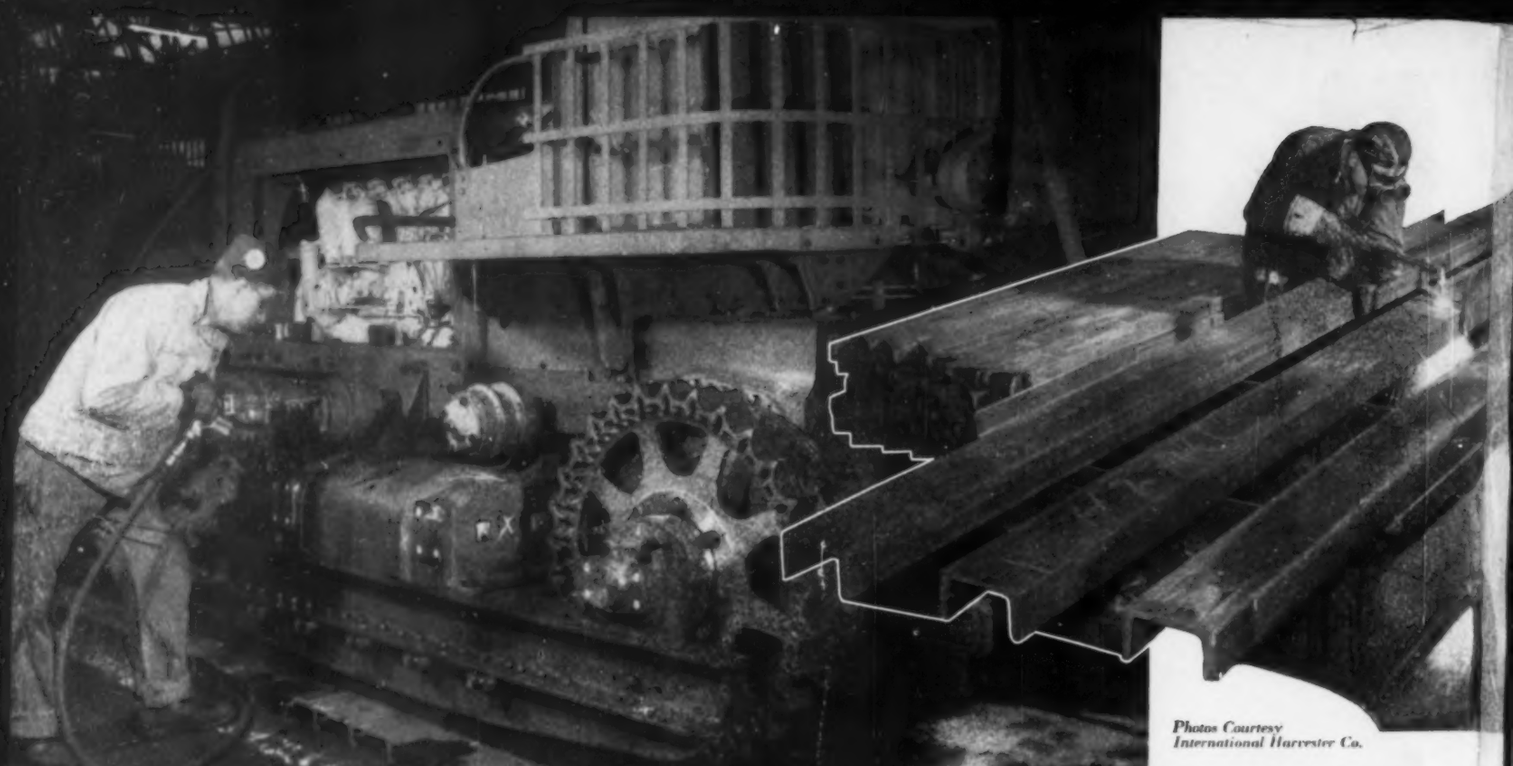
RAW-HILL
BLISHING
MPANY, INC.
CE 20 CENTS

LIBRARY
DEC 18 1944
DETROIT

***FAST DRIVING OF SCREWS** on wood ship construction is accomplished with electrically powered hand tool weighing only 8½ lb.*

CEMBER 1944

FEATURING a special pictorial section illustrating the wide range of applications of hand-operated and power-driven tools in the construction field.



Photos Courtesy International Harvester Co.

Frames of track type tractors must resist terrific bending and twisting stresses.

Stronger Backbones for Tractors Using Inland Hi-Steel

Tractor frames must be strong—particularly those for track type tractors, which are turned by stopping one track, throwing terrific bending and twisting stresses onto the frame. That is why a manufacturer of tractors chose Inland Hi-Steel for the frames of their 10-ton track type Diesel tractors; Hi-Steel offers higher strength without added weight or size.

The original tractor design called for steel with 44,000 lb. per sq. in. yield strength. For the grueling service to which these tractors are subjected, especially when a bulldozer is mounted directly on the frame, it was found that greater strength was needed. Increasing the size of the frame section would have entailed complete redesign and sacrificing many desirable tractor features.

Inland Hi-Steel offered the perfect solution to the problem. Replacing the carbon steel channels with Hi-Steel, which has a yield strength of 57,000 lb. per sq. in., made possible retaining the same size and weight of frame, while increasing strength 29.5%. All design features were retained, and adopting Hi-Steel called for no change in fabricating methods. Thousands of these sturdy, powerful tractors in service confirm the dependability of the Hi-Steel frames.

Inland Hi-Steel, the corrosion-resistant and high-strength, low alloy, has established records for service and endurance on many of the toughest peacetime and wartime jobs. Today, most of the Inland Hi-Steel goes into war jobs but when peace comes, it will again be available for the construction of equipment in which higher strength, reduced weight and greater corrosion resistance are factors in product design, sale and service.

INLAND STEEL COMPANY

38 S. Dearborn St., Chicago 3, Ill.

Sales Offices: Cincinnati • Detroit • Kansas City • Milwaukee • New York • St. Louis • St. Paul

TECHNOLOGY DEPT.

CURRENT JOBS
. . . and Who's Doing Them

BUILDINGS

Public—Navy contract for housing at Shumaker, Ark., has been awarded to **Winston Bros. Co., C. F. Haglin & Sons, Inc., Missouri Valley Bridge & Iron Co.,** and **Sollitt Construction Co., Inc.,** of Minneapolis, Minn., for $28,118,700. Another Navy contract for $10,395,189 went to **Ford J. Twaits Co., Morrison-Knudsen Co., Inc.,** and **Ben C. Gerwick, Inc.,** of Los Angeles, Calif., for supply depot near Stockton. **Geo. Sollitt Construction Co.,** of Chicago, Ill., submitted low bid of $1,700,000 for tire plant at Des Moines, Iowa. **Robert E. McKee, Inc.,** of Los Angeles, Calif., was low bidder on $1,675,000 veterans' buildings and utilities. Contract for naval personnel structures at Port Chicago, Calif., was awarded to **MacDonald & Kahn, Inc.,** of San Francisco, for $1,639,361. Low bidder on $1,000,000 naval depot at Tacoma, Wash., was **Macdonald Building Co.** and **Woodworth & Co.,** of Tacoma.

Industrial—Contract for $2,500,000 plant at Brookfield, Ill., went to **R. Benson,** of Chicago. Plant at Sun Ray, Tex., will be built by **United Engineers & Construction Co.,** of Philadelphia, Pa., for $1,200,000. **E. G. M. Cape & Co., Ltd.,** of Montreal, Que., will build $1,000,000 plant at Montreal.

Commercial—Contract for hotel at Norfolk, Va., was awarded to **Muhleman & Kayhoe, Inc.,** of Richmond, for $2,300,000. Butadiene plant at Bishop, Tex., will be built by **Gasoline Plant Construction Corp.,** of Houston, for $2,750,000.

HEAVY CONSTRUCTION

Low bid of $2,170,000 was submitted by **Gahagan Construction Corp.,** of New York, N. Y., for airport filling at East Boston, Mass. **Gerwick, Morrison-Knudsen** and **Twaits,** of San Francisco, Calif., received $1,676,965 contract for piers at Hunters Point. **Sternberg Dredging Co.,** of New Orleans, La., has $1,362,400 Navy contract for levees. Air station storehouses at El Toro, Calif., will be built for Navy by **Robert E. McKee,** of Los Angeles, for $1,188,000. Navy contract for runway and taxi strips at Patuxent River, Md., went to **C. J. Langenfelder & Son,** of Baltimore, for $1,031,647.

HIGHWAYS

Among recent highway contract awards are the following: Illinois: $656,000 to **Massman Construction Co.,** of Kansas City, Mo. Indiana: $233,200 to **Ralph Rogers & Co.,** of Bloomington. Louisiana: $193,697 to **R. M. Lilly,** of Baton Rouge; and $232,111 to **W. R. Aldrich & Co.,** of Leesville. Minnesota: $219,728 to **A. Guthrie & Co., Inc.,** of St. Paul. New Jersey: $699,084 to **Fred Berlanti & Son, Inc.,** of Harrison, N. Y. New York: $237,243 to **Lane Construction Co.,** of Meriden, Conn. Pennsylvania: $672,262 to **Potts & Callahan Contracting Co., Inc.,** of Baltimore, Md.; $173,014 to **S. J. Groves & Son,** of New York, N. Y.; $746,781 to **Booth & Flinn Co.,** of Pittsburgh; and $1,225,752 and $350,539 to **Potts & Callahan Contracting Co., Inc.,** of Baltimore, Md. Texas: $369,792 to **Austin Road Co.,** of Dallas; $193,326 to **H. L. Campbell,** of West Fort Worth; $133,539 to **R. W. McKinney,** of Nacogdoches; and $199,981 to **Gilbert Falbo Co.,** of San Antonio. Virginia: $518,874 to **E. W. Hechler,** of Richmond. Washington: $213,132 to **Sound Construction & Engineering Co.,** of Seattle.

Copyright, 1944

Established 1919

McGraw-Hill Publishing Co., Inc., 330 West 42nd St., New York (18)

Construction Methods

A Pictorial Survey of Current Practice, Equipment and Materials

JOHN ABBINK, Publisher

ROBERT K. TOMLIN, Editor — A. E. PAXTON, Manager

Editorial Staff: Vincent B. Smith, Paul Wooton (Washington)
N. A. Bowers (San Francisco) Nelle Fitzgerald
Patricia McGerr

DECEMBER, 1944

THE *How* OF IT

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

How **WALLBOARD JOINTS** were filled and taped by unskilled workers using special tools —p. 47
How **ALUMINUM PLANK** was used in surfacing airfield strip —p. 48
How **WAR-MADE INVASION PORTS** were formed of prefabricated concrete caissons and floating breakwaters towed across English Channel to Normandy beachheads —p. 50
How **SHIP CONSTRUCTION** was expedited by small-tool shortcuts —p. 54
How **CONCRETE** was produced and placed at Fontana Dam at rate of 200,000 cu. yd. per month —p. 56
How **PIPE COILS** circulating cold water were embedded in concrete of dam —p. 59
How **WOOD FORMS** for air base paving in India were built with aid of pneumatic tools —p. 60
How **HEDGEROW PLOW** was used by Allies to pierce thick embankments in Normandy —p. 62
How **THREE PORTABLE FRAMES** assisted in erection and fitting of bottom plates of ships —p. 63
How **AIR-ENTRAINING CEMENT** was used in mix to replace spalled concrete at hydro station —p. 64
How **HAND-OPERATED AND POWER-DRIVEN TOOLS** have wide range of operations in construction field —p. 67
How **TAPERED BORES** in ship propeller shaft flanges were produced by new-type machine —p. 68
How **CHAIN SAW** was transported on mule's back by U.S. Army Engineers —p. 74
How **PIPE PUSHER** operated from short trench to drive pipe through ground under flooring —p. 80
How **POWER DRIVEN TOOLS** aided Victory ship builders —p. 81
How **SMOKESTACK** was repaired by steel rigger suspended in bos'n's chair from tip of 135-ft. boom —p. 87

McGRAW-HILL PUBLISHING COMPANY, INC., 330 WEST 42d STREET, NEW YORK (18), N. Y.

JAMES H. McGRAW, Founder and Honorary Chairman

Editorial and Publishing Offices: 330 West 42nd St., New York (18); 520 North Michigan Ave., Chicago (11); 68 Post St., San Francisco (4); 738-9 Oliver Bldg., Pittsburgh; Aldwych House, London, W. C. 2, England. Branch Offices: Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Los Angeles; Atlanta, Ga.

JAMES H. McGRAW, JR., President
HOWARD EHRLICH, Executive Vice-President for Business Operations
JOHN ABBINK, Executive Vice-President for Editorial Operations
CURTIS W. McGRAW, Vice-President and Treasurer
JOSEPH A. GERARDI, Secretary
J. E. BLACKBURN, Circulation Manager

CONSTRUCTION METHODS, December, 1944. Volume 26, Number 12. Published Monthly, price 50¢ a copy. **Return Postage Guaranteed.** Allow at least ten days for change of address. All communications about subscriptions should be addressed to the Director of Circulation, 330 West 42nd Street, New York (18), N. Y. **Subscription rates**—United States, Mexico and Central and South American countries, $1.00 a year, $1.50 for two years, $2.00 for three years. Canada, $1.50 a year, $2.50 for two years, $3.00 for three years. Great Britain and British Possessions, 12 shillings a year, 36 shillings for three years. All other countries, $2.00 a year, $6.00 for three years. Entered (as reentered) as second class matter December 16, 1936, at the Post Office of New York, N. Y., U. S. A., under the act of March 3rd, 1879. Printed in U. S. A. Cable address: "McGrawhill, New York." Member of A. B. P. Member of A. B. C. Contents copyrighted 1944 by McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York (18), N. Y.

CHANGE OF ADDRESS

McGRAW-HILL PUBLISHING COMPANY
330 West 42nd Street, New York (18), N. Y.

Director of Circulation:

Please change my address on Construction Methods

From .....

.....

To .....

.....

Signed .....

THE JOB JESTER

CARTOONS DRAWN FOR CONSTRUCTION METHODS

"I hope those contractors get a job soon. I'd like to use my phone."

"We hope he gets adjusted. He's just been released from the Navy."

WHAT TO DO ABOUT

Winter Concreting

HEAT-CURED only one day at 70°, 'Incor' concrete is service-strong, safe from freezing . . . and at 28 days produces strengths 25% to 30% greater than even Lone Star Cement concrete cured 3 days. Seventeen years' performance proves that 'Incor' 24-Hour Cement makes winter work safe, quick, economical.

SAVES 2 DAYS HEAT PROTECTION ON EACH POUR

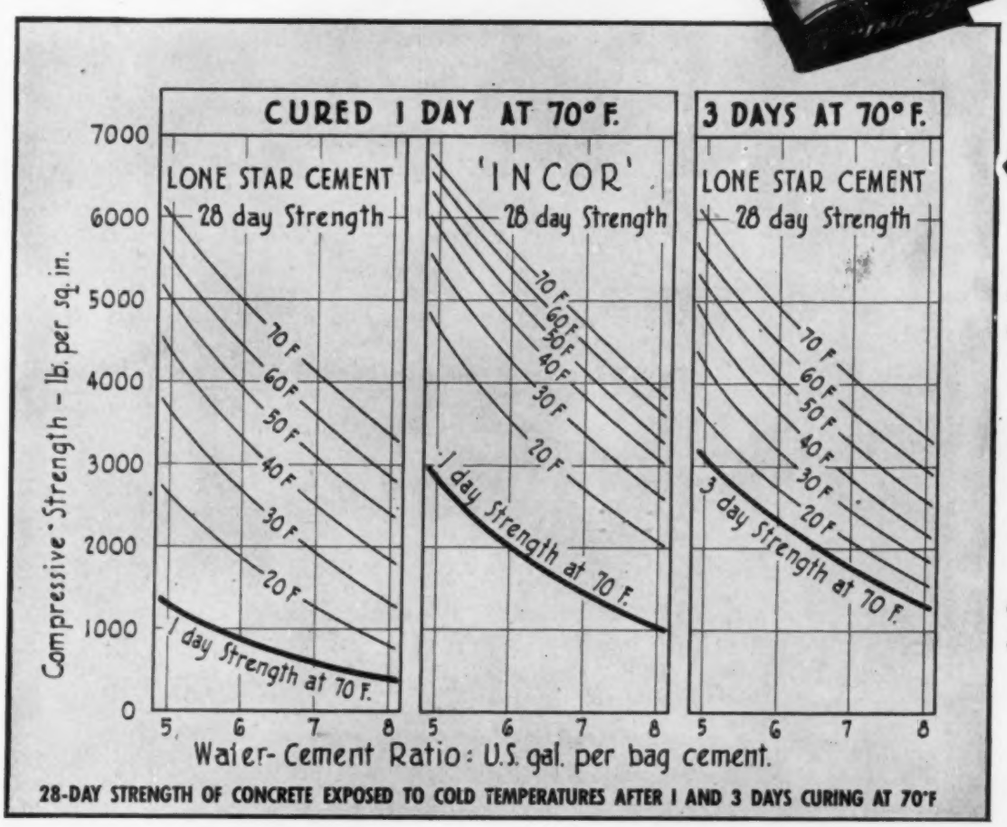
CUTS FORM AND TARP COSTS IN HALF

REDUCES FREEZING RISK

KEEPS JOB SPEED UP—JOB COSTS DOWN

Plan and build it with 'Incor'*. Write us at 342 Madison Avenue, New York 17, for "Winter Concreting Book."

*Reg. U.S. Pat. Off.



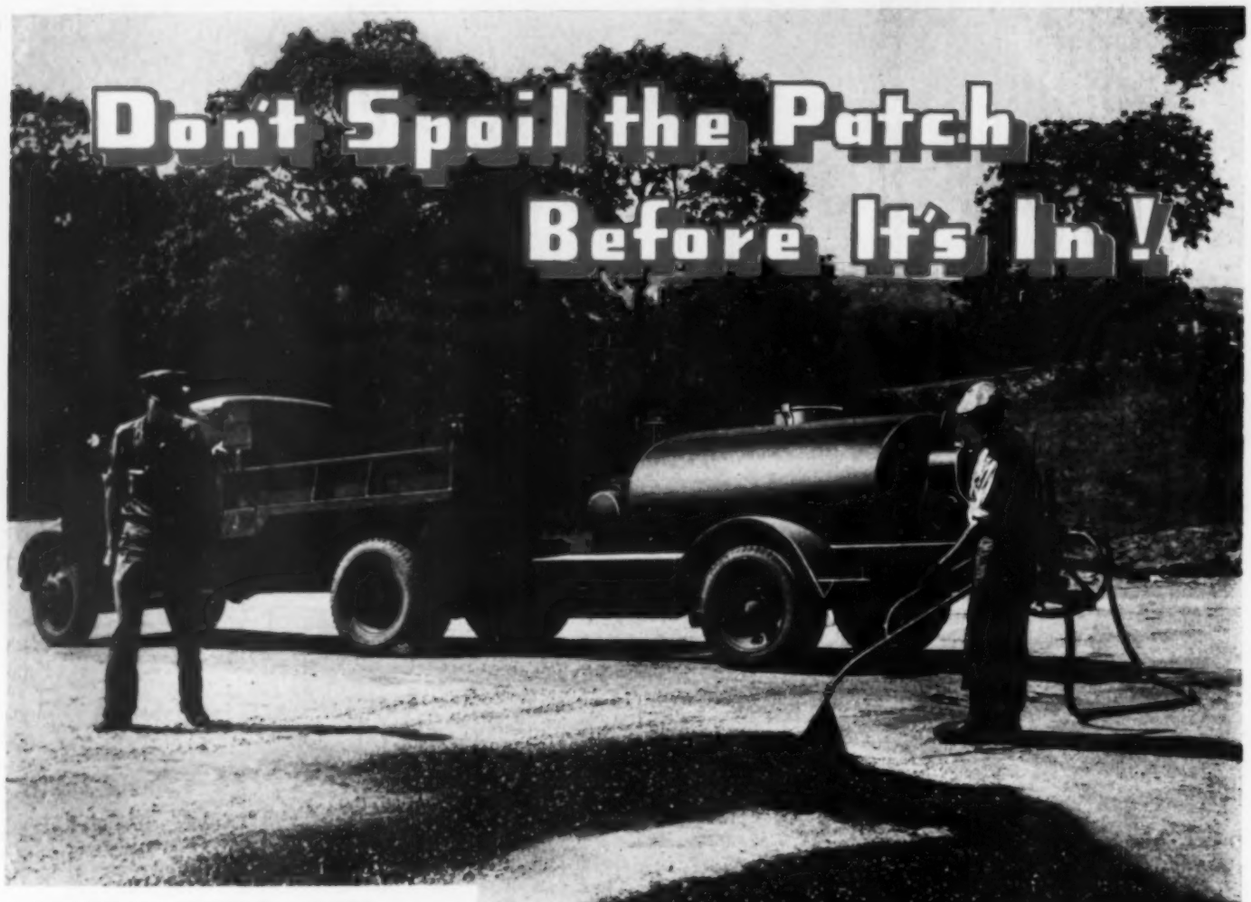
28-DAY STRENGTH OF CONCRETE EXPOSED TO COLD TEMPERATURES AFTER 1 AND 3 DAYS CURING AT 70°F

LONE STAR CEMENT CORPORATION

Offices: ALBANY • BIRMINGHAM • BOSTON • CHICAGO • DALLAS • HOUSTON • INDIANAPOLIS • JACKSON, MISS. KANSAS CITY, MO. • NEW ORLEANS • NEW YORK • NORFOLK • PHILADELPHIA • ST. LOUIS • WASHINGTON, D. C.

LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS: 15 MODERN MILLS, 25 MILLION BARRELS ANNUAL CAPACITY

Don't Spoil the Patch Before It's In!



DON'T put bituminous *repair material over a wet surface.*

DON'T allow any break-up or *chuck hole* in your streets *to get progressively worse.*

DON'T use *too much oil* and don't use *too little oil*—improper amounts of oil are responsible for many failures.

DON'T *burn* the *bituminous material*—to do so *destroys its binding qualities.*

DON'T make patches *too thin.*

DON'T make patches *too high* or *too low*—always see that the final *patch line* is *even* with your existing *mat.*

DON'T allow water to stand in your side ditches—*keep the water moving* and keep all drainage open.

When in doubt on any type of maintenance *write* the American Asphalt Institute—801 Second Avenue—New York City, New York, or its nearest district office.

For information concerning all types of Bituminous Maintenance Equipment write STANDARD STEEL WORKS, North Kansas City, Missouri, for the name of the nearest dealer.

SALES OFFICES IN PRINCIPAL CITIES

OTHER PRODUCTS

Asphalt Distributors • Tar Kettles • Maintenance Distributors • Burners • Street Flushers • Spray Units • Supply Tanks Surface Heaters • Shoulder Rollers

Standard Steel Works
NORTH KANSAS CITY, MO., U.S.A.

No matter what your off-the-highway hauling problem may be . . . big loads . . . steep grades . . . short or long hauls . . . Rear-Dump and Bottom-Dump EUCLIDS will move more pay dirt faster and at lower cost. Built in every part for tough hauls, Euclids combine minimum vehicle weight with maximum power and strength for large capacity off-the-highway hauling.

Fast, easy loading with modern excavating equipment . . . speed in hauling and dumping . . . rugged dependability day in and day out . . . these are reasons why leading contractors and industrial users of hauling equipment are cutting costs and increasing production with Euclids . . . reasons why Euclids are *your* best bet for any material and any haul.

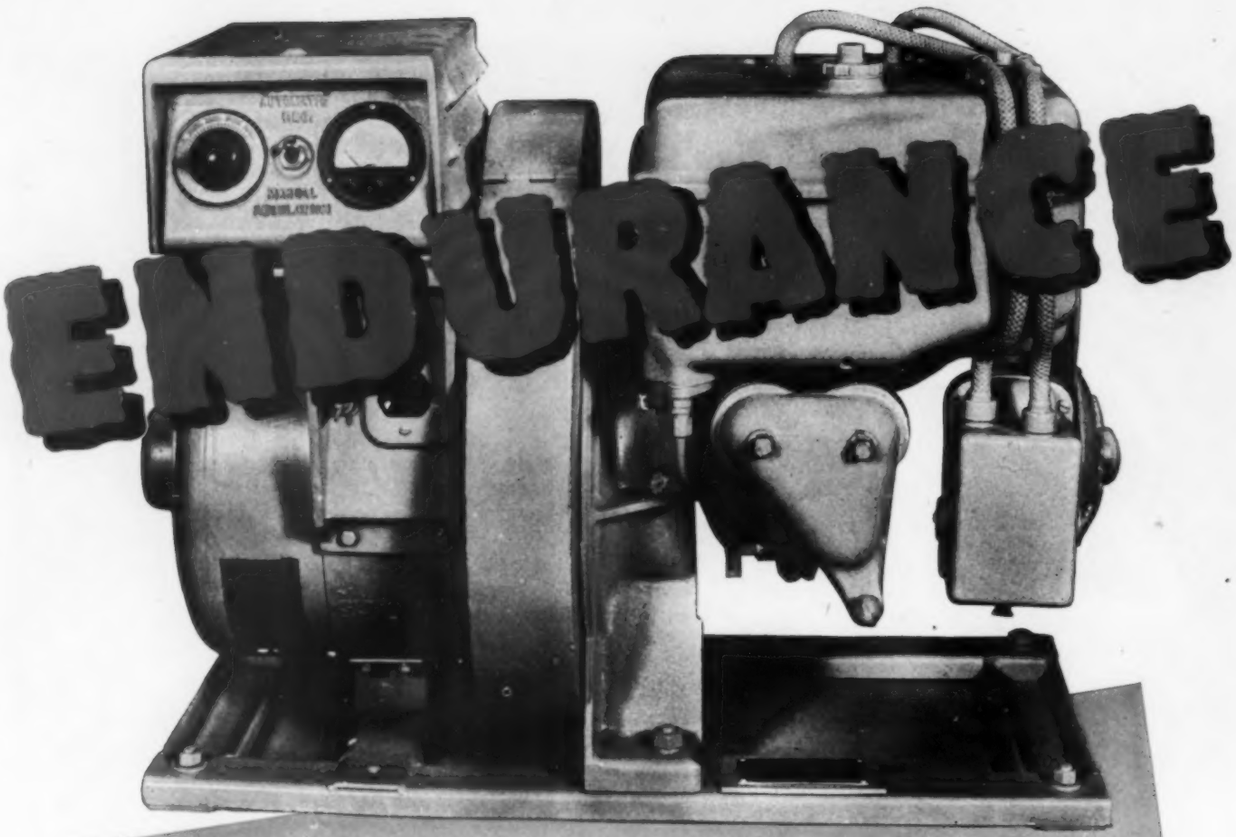
Write for your copies of two new books that show Rear-Dump and Bottom-Dump EUCLIDS at work on construction jobs and mine and quarry operations.

The EUCLID ROAD MACHINERY Co. · · · Cleveland 17, Ohio

EUCLID SELF-POWERED HAULING EQUIPMENT For EARTH ROCK COAL ORE

EUCLID THE PIONEER

ENDURANCE



• In warfare, both men and machines are called upon to meet stupendous endurance tests. Kiekhaefer-built Mercury Two-Cycle, Air-Cooled Engines were among the first special engines to reach the fighting fronts. They have made exceptional records for dependability, endurance, and trouble-free service in many unusual applications.

The ability of Mercury Engines to deliver MOST POWER PER POUND OF WEIGHT makes them particularly suited to compact, portable equipment such as the generator set pictured here. A feature of vital importance is the special Kiekhaefer Governor...providing positive speed control under all varying load conditions.

Where the foot soldier carries his own equipment, in airplanes where the saving of weight is a critical factor, on equipment that must go into inaccessible places, Kiekhaefer Mercury Engines meet the challenge.

LET KIEKHAEFER POWER YOUR POSTWAR PRODUCT

If you have developed or are developing a product that requires lightweight, flexible power, Kiekhaefer may be able to supply or develop the exact engine to meet your needs.

Write for Free Bulletin 103.

STAY IN THE FIGHT — BUY ANOTHER WAR BOND TODAY — 6th WAR LOAN

KIEKHAEFER CORPORATION

CEDARBURG • WISCONSIN

MERCURY INDUSTRIAL ENGINES — MERCURY OUTBOARD MOTORS . . . *built to use — built to last*

How new construction principle increases life of off-the-road tires

Service reports show B. F. Goodrich tires last far longer than other makes

A NEW principle in building off-the-road tires is increasing the life for B. F. Goodrich tire users on jobs throughout the world. Here is a letter received from a B. F. Goodrich field representative:

"We have just received a report on the performance of 18.00-24 20-ply Universal tires used on bottom dump Euclids in a coal stripping operation. The following is a record of hours of service for four tires recently removed:

Tire 218 4269 hours

Tire 217 4327½ hours—this tire was too slick for traction and will be mounted later on a trailer wheel for further service.

Tire 173 4212 hours

Tire 190 4060 hours

Tire 181 One of the first two Universal tires put in operation by this firm now has over 4600 hours of service on it and is still going strong.

"Incidentally, before using our Universal tire, this company had an expectancy of 2500 hours of service on this size tire."

Strip-mine operator writes

A northern Michigan and Minnesota operator handling iron ore wrote us direct as follows:

"Since January, 1941, mainly B. F. Goodrich Rock Service and Universal tires have been in use at this property. These tires have given utmost satisfaction under severe conditions with percentage of failures so relatively small that it may be disregarded."

Far greater mileage

Here are some mileage records received from other contractors: 17,226 miles from B. F. Goodrich tires compared with 12,501 for the best of all three ordinary tires used; 15,017 miles compared to 11,304 for the best ordinary tire; 17,599 miles compared to 6476 for the best ordinary type.

These reports are not exceptional. They cover, of course, tires made entirely of crude rubber. Tires containing some synthetic may not last as long, but the superiority of B. F. Goodrich tires will probably still be just as great because of the new construction features described below. In almost every case where accurate service records are kept B. F. Goodrich off-the-road tires show up best.

Tires bruise-protected

One of the reasons for this superiority is the bruise-protection built into the tires of 11.00 cross section and larger. Under the tread are four breakers insulated with thick layers of shock-resisting rubber. Cords in each of the two pairs of breakers run in the same direction so they will flex in unison rather than rub against each other. Under impact the cords stretch and return to their original position, distributing the force of the blow and allowing it to be absorbed by the rubber between them. Thus the shock passed on to the cord body is greatly reduced and there is less chance of bruise-breaks and ply separation.

All B. F. Goodrich off-the-road tires are made with special rubber compounds which resist cutting.

All in all there are five different tread designs offered, each designed for maximum service on a particular type of operation.

←The Universal
—for two-way traction and maximum resistance to the abuses of rocky surface hauling.

The Rock Service→
—for sure-footed traction in mining, quarrying, and general contracting.

←The Super Traction
—for earth-moving tractor wagons and trailers.

The Earth Mover→
—for free-rolling wheels on scrapers and trailer wagons.

←The All-Purpose
—for combination off-the-road and on-the-road service. Combines super-traction and long mileage.

Each of these tires has a tread designed to give superior wear in the service for which it was intended.

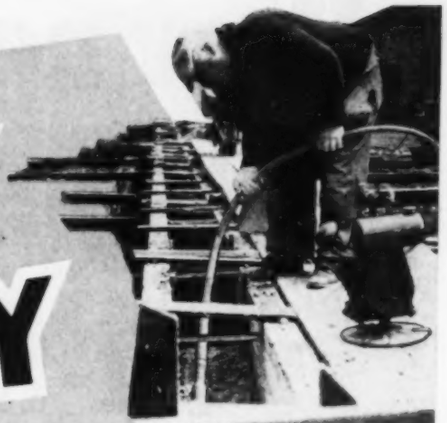
Make this test

We urge every user of off-the-road equipment to try B. F. Goodrich tires alongside of other makes. Keep accurate service records. Compare natural rubber tires with natural rubber, synthetic with synthetic, and prove to yourself that you can save money with B. F. Goodrich tires.

Supplies of most sizes of these tires are strictly limited. It is well to place tentative orders early. See the local B. F. Goodrich dealer for information, or write us direct. The B. F. Goodrich Co., Akron, Ohio.

B.F. Goodrich
Truck & Bus Tires

Be Ready V-DAY



with **Mall** REG. U.S. PAT. OFF.

PORTABLE POWER TOOLS

★ **IMMEDIATE DELIVERY ON MOST TOOLS**

MallSaws 2 powerful electric models: model 85 has 8½" blade and 2¾" cutting capacity for cross cutting and ripping rough or dressed lumber, making bevel cuts up to 45 degrees and other sawing. Model 120 has 12" blade and 4½" cutting capacity for extensive sawing and ripping of heavy lumber and timbers. Both models operate an abrasive wheel for cutting non-ferrous metal, cutting and scoring tile, stone and concrete.

1/4" **MallDrill** a handy, compact, light-weight (3 lb.), cool-running drill for drilling in wood, metal and plastics. Made to order for close quarters. Ruggedly constructed with steel alloy gears and extra long brushes for long service. Commutator is easily accessible for servicing. Brushes can be replaced without dismantling drill. Available for 110-volt A.C. or D.C., also 220-volt A.C. or D.C.

Mall CONCRETE VIBRATORS

A Size and Type for Every Job. ★ 1½ H.P. Gasoline Powered Unit. ★ 3 H.P. Gasoline Powered Unit with round base mounting. ★ 3 H.P. Gasoline Powered Unit with wheelbarrow mounting. 1½ H.P. Universal Electric Unit. Pneumatic Unit. ★ Interchangeable swivel-fitted attachments for Vibrating Concrete, Wet Wall Rubbing, Wire Brushing, Grinding, Sanding, Drilling in Wood, Brick, Steel, Stone, and Sharpening Tools are available with Gasoline-Powered Vibrators.

Mall CHAIN SAWS

Gasoline Engine and Pneumatic models are available in many cutting capacities for cutting piling and squaring heavy lumber and timbers to size. Unskilled laborers can use saws successfully after a few instructions. 36" capacity saw will cut 60—18" piles per hour—a 15 hour job for 2 carpenters with a cross cut. Pneumatic models will cut piling under water. All models make fast, accurate, horizontal, vertical or any angle cuts in soft or hardwood. Electric Chain Sharpeners also available.

Ask your Supplier at once for MallSaws, ¼" MallDrills, Mall Vibrators, and Mall Chain Saws or write direct for literature and prices.

MALL TOOL COMPANY **7757 South Chicago Avenue, Chicago 19, Illinois**

ARMY E NAVY

BUY WAR BONDS

Mall REG. U.S. PAT. OFF. **PORTABLE POWER TOOLS**

THE Northwest Model 71—big, powerful—40 tons capacity—yet easily maneuvered to any part of the job—and it loads itself on one flat car. Unusual versatility is made possible by various drum and boom hoist combinations that will take care of any steel handling job.

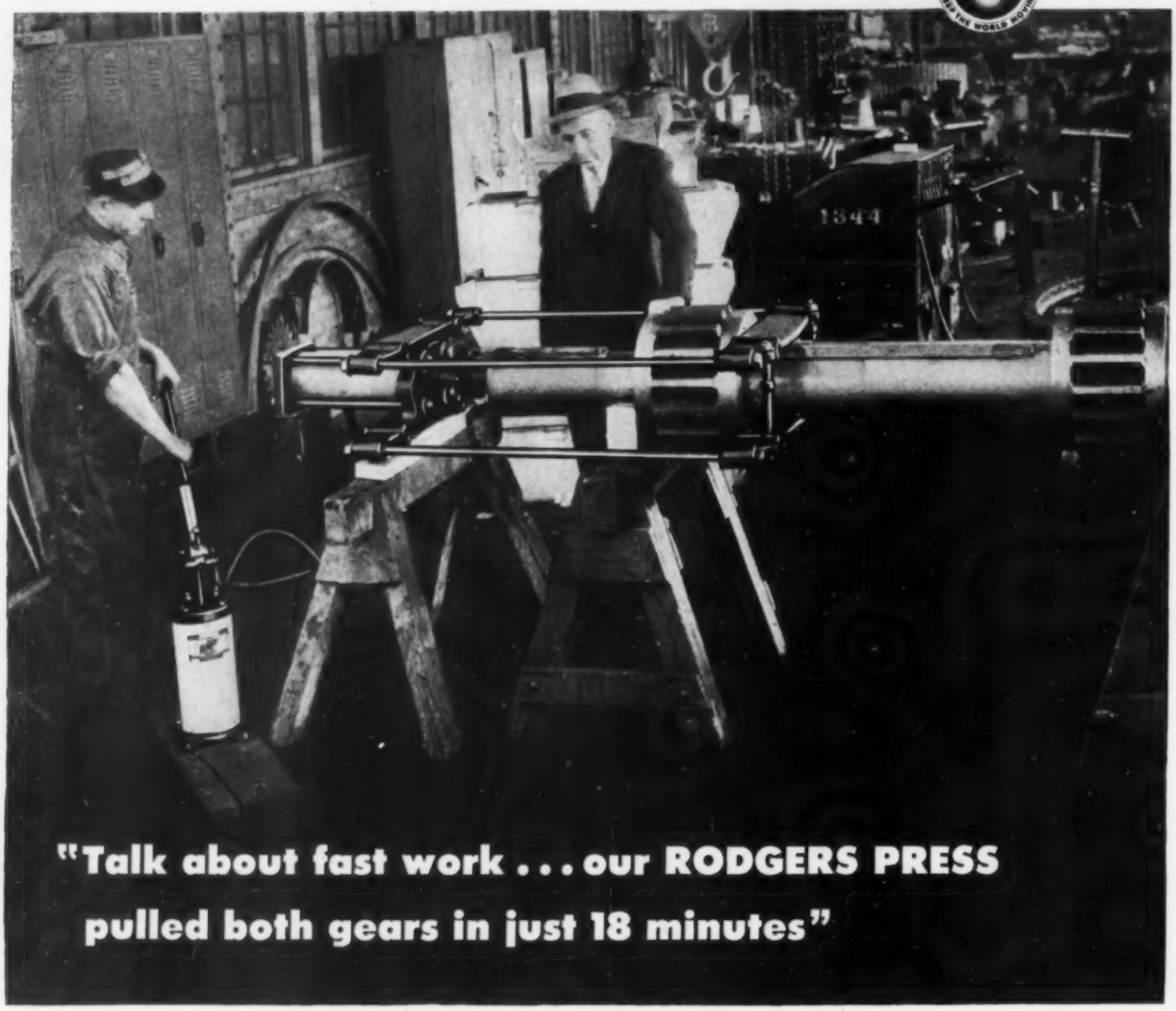
The Model 71 can be equipped with either two or three live drums in addition to the Independent High Speed Boom Hoist. A flange connected boom in conjuction with the Boom Hoist Bridle and Pendant Lines make boom length changes easy without reeeving cables. A Hammer Head boom permits higher lifts without fouling the boom.

Smooth easy control is provided by the Northwest "feather-touch" clutch control, another Northwest exclusive feature. The "feather-touch" control makes possible the throwing of the heavy drum clutches by the power of the engine. Fractional inch moves are possible and the feel of the load is always present.

Here is a crane you should be familiar with for those postwar steel erection and heavy lifting jobs.

NORTHWEST ENGINEERING COMPANY
1728 Steger Building
28 E. Jackson Boulevard, Chicago 4, Illinois

NO. 22 OF A "READY-WITH-A-RODGERS" SERIES



"Talk about fast work . . . our RODGERS PRESS pulled both gears in just 18 minutes"

"Pulling gears from a shovel shaft used to be a 12-hour grind before we got our Rodgers Universal Press. It meant dismantling our big shop press and reassembling it around the shaft... a job we had to do twice, to get at both gears.

"With the Rodgers, we now pull those same gears in 18 minutes. Your portable press has streamlined this operation . . . and that's just one way it is saving us time and money."

This experience was reported to us by one of the top manufacturers in the equipment field... is typical of many others describing the economical performance of the all-purpose Rodgers Universal Press. *Get complete information and prices today. Write or wire Rodgers Hydraulic, Inc.,* 7403 Walker Street, St. Louis Park, Minneapolis 16, Minn. *"If it's a Rodgers, it's the best in Hydraulics."*

Uses for **RODGERS UNIVERSAL HYDRAULIC PRESS**
Gear Pulling • Wheel Press Work • Jacking Pipe • Erecting Machinery • Relocating Machinery • All-Purpose Jack

RODGERS HYDRAULIC, Inc.

Here are 7 *Reasons*

WHY CONTRACTORS CHOOSE THE

SARGENT OVERHEAD

1 The **Sargent Overhead** is a tractor loader and bulldozer. It loads and dumps easily all materials, including mud, clay, muck and rubbish. It digs up top soil and old road surfaces and dumps anywhere in the truck body. A bulldozer or angledozer can be attached or detached in 15 minutes.

2 The **Sargent Overhead** is ruggedly built and stands up under cruel treatment. It utilizes all the power and push of a crawler tractor. It's fast. . . . In normal digging, an experienced operator can load at the rate of 4 buckets per minute.

3 Used as a utility machine on big projects, the **Sargent Overhead** does many jobs that ordinarily tie up an oversized, hard-to-move power shovel. There are always hundreds of these odd jobs on a large project made to order for the **Sargent Overhead.**

4 Smaller contractors can move the **Sargent Overhead** on a fast truck or trailer from job to job, cleaning up everything from initial excavation to final grading. Or if the jobs are not too far apart, the **Overhead** moves under its own power.

5 As a tractor loader, there is no twisting and turning to ruin tracks and cause expensive breakdowns or overhauling. The action of the **Sargent Overhead** is always in a straight line. It digs into the material whether sand or hard-pan, gets a full bucket, swings gently overhead and dumps the load in any selected spot in the truck.

6 Because the **Sargent Overhead** works with a straight-line motion, it operates effectively in narrow places where there is no room for revolving shovels or "twisting and turning" front-end loaders.

7 During off-seasons, it is a cinch to rent the **Overhead** for city and town road work and snow removal. Industrial plants and public utilities use the **Overhead** to move or load coal and other materials.

MAINE STEEL
INCORPORATED
SOUTH PORTLAND, MAINE

FOR LARGE CONTRACTORS OR SMALLER OPERATORS THE SARGENT OVERHEAD IS A PROFIT MAKING MACHINE

U. S. Marine Corps Photo

EQUALLY expert with bulldozer or bazooka, road roller or rifle, the Seabees have proved themselves the seventh wonder of the construction world. At this remote Pacific outpost, they rush a road through to the site where a dock will be built.

Just as important as the efficient Seabees in the successful building of vital bases is the efficient operation of their construction equipment. And whether on a tropical Pacific island or right here at home, efficient operation in large measure depends on effective lubrication—Texaco.

Texaco Alcaid, Algol or *Ursa Oils* in air compressors, for example, assure wide-opening, tight-closing valves, free piston rings, open ports, clear lines, continuous air supply. They also assure maximum service life between overhauls, fewer repairs and replacements. Their use is world-wide.

Texaco lubricants have proved so effective in service they are definitely preferred in many fields, a few of which are listed at the right.

Texaco Lubrication Engineering Service is available to you through more than 2300 Texaco distributing points in the 48 States. The Texas Company, 135 East 42nd St., New York 17, N.Y.

THEY PREFER TEXACO

★ More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

TEXACO

TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON SUNDAY NIGHTS ★ METROPOLITAN OPERA BROADCASTS SATURDAY AFTERNOONS

KIEWIT'S TOURNAPULLS SHOW HOW

You Can Profitably Handle Tomorrow's LONGER HAULS

Average 10 Loads and 120 Cu. Yards Hourly on 3000-foot Round Trip Haul

Kiewit's Tournapulls are pusher loaded in 50 to 60 seconds. One pusher handles 3 to 4 Tournapulls, depending on haul length. Compare this loading cost with shovel or elevating grader costs.

Tournapulls spread their own loads on the move, do away with need for special spreading tools. Big pneumatic tires give you plenty of traction with a minimum of wearing parts; also cushion equipment against shock and reduce operator fatigue.

To help build a 600,000-yard earthfill dam near Cumming, Iowa, Peter Kiewit Sons Co., uses 3 Super C Tournapulls. A time study on the job shows the following performance:

Material . . . moist sandy clay
Loading time . . . 50 to 60 sec.
Loading distance . . . approx. 75 feet
Haul distance . . . 3000 feet round trip
Cycle time . . . 6 min. (average)
No. trips per hour . . . 10
Estimated load per trip . . . 12 cu. yds.
Hourly yardage . . . 120 cu. yds.

Like Kiewit and many other alert contractors, you can get profit-increasing yardage on long hauls by using Tournapulls. Here's why—

Tournapull design concentrates load weight on the front drive wheels to give you greater traction, quicker acceleration and faster turning. Carryall Scraper, used with Tournapull, utilizes same cable-controlled, positive-ejection system which has proved so successful with tractors in past. You get the same one-man loading, hauling and spreading efficiency, but travel 2 to 3 times faster than the fastest crawling tractors. Result: You move big yardages faster, farther and more profitably with Tournapulls.

LOWER FIRST COST, TOO

What's more, Super C Tournapulls cost from $500 to nearly $7,000 less than crawler-scraper units of comparable hourly capacity. Operating costs run approximately 4% to 21% less per hour. Figure what that can mean to you on a 10,000-hour operating life.

Why use more costly, slower moving rigs when you can have the fast, rubber-tired power of Tournapulls? See your LeTourneau distributor NOW for priority requirements and delivery dates.

LE TOURNEAU CO-OPERATOR WILL HELP YOUR MEN

Written in "on-the-job" language, the LeTourneau Co-Operator is packed with helpful, worth-while dope for operators, servicemen, superintendents, engineers, owners—anyone who works with LeTourneau equipment. Published 10 times yearly. It's free. Write for copies for yourself and your men today.

LETOURNEAU PEORIA ILLINOIS · STOCKTON, CALIFORNIA **JOB-PROVED 2300 BUILT AND SHIPPED** **TOURNAPULLS**

Manufacturers of TOURNAPULLS*, ANGLEDOZERS*, BULLDOZERS, TILTDOZERS*, CARRY-ALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, TOURNATRAILERS*, TOURNA-CRANES*, TOURNATRUCKS*, SHEEP'S FOOT ROLLERS, TOURNAROPE*, TOURNAWELD*, TOURNALIFTS*.

***Trade Mark Reg. U.S. Pat. Off.**

RUBBER-TIRED POWER FOR FASTER EARTHMOVING

HOW A B-G MIXER PROVIDES VERSATILITY

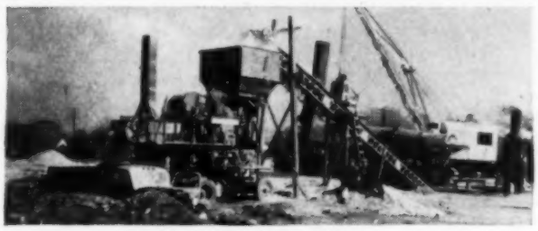
For Low-Cost Roads—
The B-G Mixer and Bucket Loader Form a Travel Plant

● High-type mix . . . intermediate mix . . . low-cost road mix! There is a combination of B-G units to make a plant set-up for producing bituminous mixtures under any specification, without employing unnecessary, costly units.

Just couple the Mixer to a B-G Bucket Loader and you have a travel plant that injects high quality into low-cost roads—an outfit that maintains a steady output of *plant-mixed* material mile after mile.

For the production of a wide range of intermediate bituminous mixes, team up the same B-G Mixer with a Dual Drum Dryer. To the accurate proportioning of the Mixer is now added drying to the previously-sized aggregate.

When high-type mixes are needed, add a B-G Gradation Control Unit to the same Mixer and Dryer. Now the plant gives you complete control of aggregate sizing, gradation and moisture control . . . meets most rigid specification requirements . . . yields a constant stream of absolutely uniform mix. For complete information on this versatile equipment, write the Barber-Greene Company, Aurora, Illinois.



For Intermediate Mixes—
The B-G Mixer Is Teamed Up With a Dual Drum Dryer

For High-Type Mixes—
To the Mixer and Dryer Is Added the B-G Gradation Unit

41 12

Barber-Greene B G *Constant Flow Equipment*

It takes a TOUGH Air Compressor for jobs like this!

In tough construction jobs, where compressed air is needed and the going is rough, use a Schramm Air Compressor.

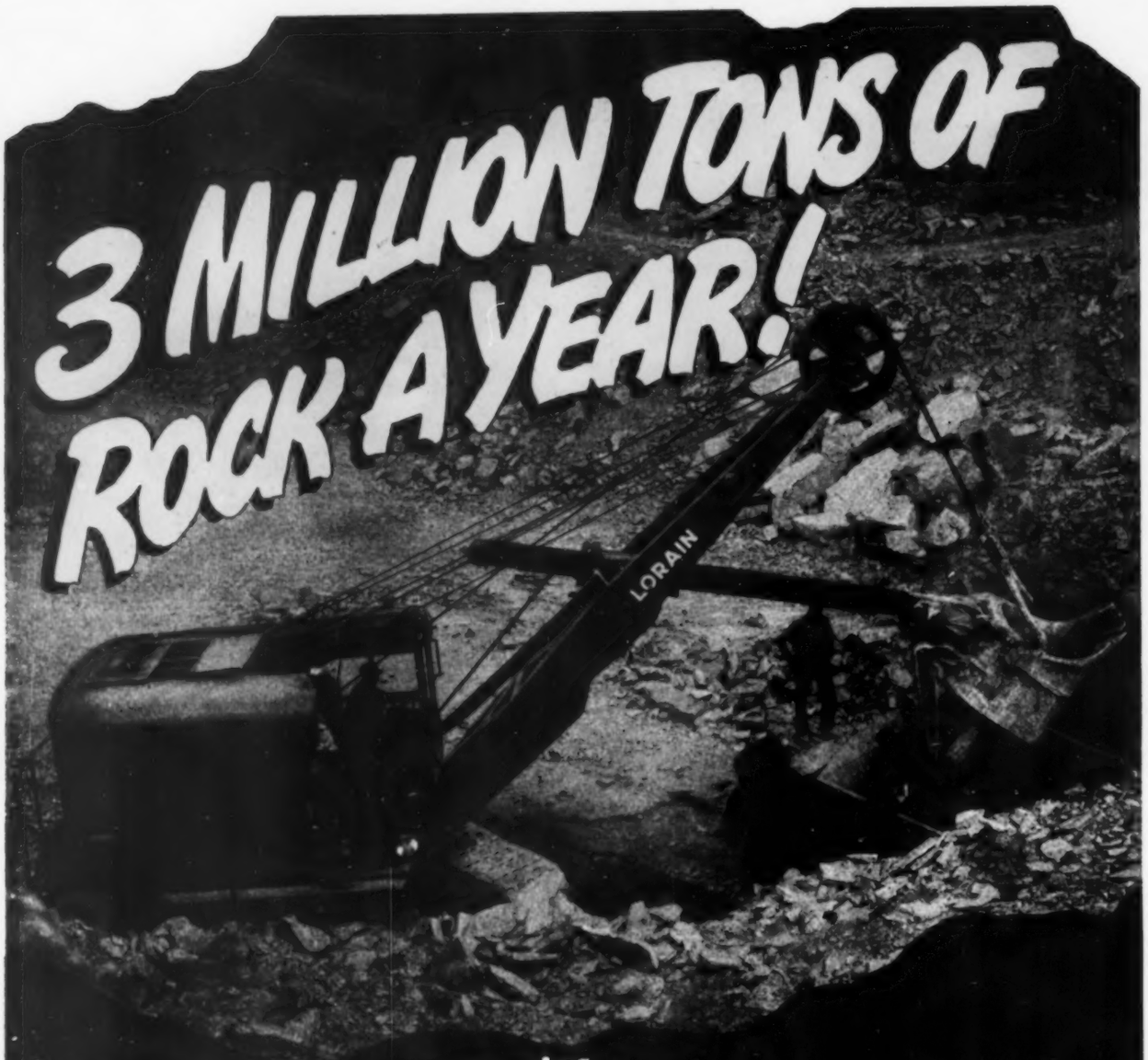
Ruggedness of construction—yet light in weight—is a big feature of the Schramm Compressor . . . a feature that enables you to easily move it about, going into even rough-and-tumble places—and all the while furnishing as much compressed air as you want!

Schramm Compressors—both stationary and portable—are completely water-cooled—compact—sturdy! For *any* compressed air job use a Schramm. Detailed information is in our illustrated Bulletin EC-44, yours for the asking.

SCHRAMM INC

THE COMPRESSOR PEOPLE
WEST CHESTER
PENNSYLVANIA

3 MILLION TONS OF ROCK A YEAR!



Job-Tested Proof that Lorains Are Money-Makers in Rock . . .

A 3,000,000 ton payload of crushed rock in a single year. That's the story of Lorain performance and production on this quarrying operation* where each of five 2 yd. Lorain 82's averaged over 50,000 tons of rock a month for twelve consecutive months.

A steady rock diet like this means plenty of power—and Lorains are long on power which is applied through: (1) The Center Drive design which permits ganging-up full engine power on any one operation; (2) the Hydraulic Clutch that cushions impacts and shocks, absorbs stresses and strains, prevents engine stall and protects cable life.

Keep the 2 yd. Lorain 82 (with hydraulic clutch) in mind for those jobs where big production means bigger profits. For complete details get in touch with your Lorain distributor, now!

THE THEW SHOVEL COMPANY • Lorain, Ohio

*Location on request

Reg. Trade Mark

thew-Lorain

CRANES • SHOVELS • DRAGLINES • MOTO-CRANES

OFFICIAL U.S. NAVY PHOTOGRAPH

New beachheads are being established through coordination of many different branches and divisions of our armed forces. Air Corps . . . Navy . . . Marines . . . Army . . . Seabees and every other command that operates with them. It is teamwork that makes the landing possible.

Coordination in Industry, too, has contributed mightily to the war effort. Faced with the many difficulties requiring "increased production with reduced man power", the Construction Industry has performed miracles through coordination of their own facilities.

We salute our Fighting Men, and pay tribute to those on the home front who have provided the essential materials and equipment. American teamwork will never be defeated.

MADE ONLY BY

A. LESCHEN & SONS ROPE CO.

WIRE ROPE MAKERS — ESTABLISHED 1857

5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

NEW YORK . . . 90 West Street
CHICAGO . . 810 W. Washington Blvd.
DENVER . . . 1554 Wazee Street

HERCULES RED STRAND WIRE ROPE

SAN FRANCISCO . . 520 Fourth Street
PORTLAND . . 914 N. W. 14th Avenue
SEATTLE . . 3410 First Avenue South

"CONTROLLED TRACTION

In the photograph above, and diagram at the left, the "99-M" is using "Controlled Traction" on a road grading job to move the material out of the ditch, and up the slope. This operation is always difficult, and frequently impossible, for ordinary Motor Graders.

• Whenever you see a "99-M" with its rear end offset, as in these photographs and diagrams, you can be sure that it is moving more material farther, and doing the job faster, than an ordinary Motor Grader could do it. "Controlled Traction" is the reason.

Getting down to fundamentals, the main job for any self-propelled grader is *to move a satisfactory amount of material with the blade, and at the same time keep moving in the desired direction.*

To "move a satisfactory amount of material" requires adequate traction, which is something the All-Wheel Drive "99-M" Power Grader has in abundance.

To "keep moving in the desired direction" means that there must be a way to overcome the side thrust caused by the load on the angled blade. If this control is lacking, the grader slides sideways.

CONTROLLED TRACTION involves steering the rear wheels, and angling the frame, until the combination of rear wheels pushing

moves more material... farther and faster

behind the toe of the blade, front wheels pulling ahead of the heel of the blade, and blade practically at right angles to the frame in its angled position, *balances the load*, and makes it easy for the "99-M" to move straight ahead with a blade load that would either stall an ordinary Motor Grader, or cause it to slide sideways.

AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U. S. A.

In this photograph and diagram, the "99-M" is using "Controlled Traction" to handle a tremendous windrow of "oil mix," using the entire 13 ft. blade, and missing the windrow with all wheels. The arrows in the diagram show how the rear drivers push behind the toe of the blade, while the front drivers pull ahead of the heel of the blade.

BUILDERS OF ROAD MACHINERY

Austin-Western

SINCE 1859

BUY MORE WAR BONDS

VALVE troubles result in excessive consumption of lubricating oil, rough running and stalling engines, hard starting. As a rule, most of these valve troubles are caused by mechanical difficulties, although some result from slow speed operation, permitting excessive deposits.

CHIEF CAUSES OF VALVE FAILURE

1. *Insufficient Tappet Clearance* . . . Correction lies in more frequent tappet inspection and accurate clearance adjustment.

2. *Valve Face or Seat off Center* . . . This trouble may result in heavy gum and coke deposits piling up on under side of valve head and forcing it off seat. Here correction lies in proper valve grinding, or replacement.

3. *Warped Valves* . . . Valves that are warped will apparently hang open at high speeds while clearing at idle. Reseating or replacement is only correction. Reducing abnormal temperatures will likely prevent repetition.

4. *Weak Springs* . . . Replace with springs meeting manufacturer's specifications for spring tension.

5. *Worn Valve Guides* . . . Guides become worn from dirt in air intake or oil resulting in coke or gum deposits that build up on valve stems because of excessive oil. This may be corrected by more frequent service of air cleaner or installing more efficient air cleaner; and replacement of worn guides.

6. *Deposits on Valve Seat* . . . This is the most frequent cause of leaky valves with consequent loss in power and fuel efficiency. Source of this trouble is usually heavy carbon or lead deposits in combustion chamber, very rarely from foreign matter within combustion chamber. Narrower valve seats and strong springs with more accurate grinding technique are remedies.

7. *High Temperature Exhaust* . . . Caused either by back pressure due to restricted exhaust system or poor carburetion or late timing. This condition results in warped valves and assists in building up varnish, lacquer, gum or deposits on valve stems, resulting in sticky and/or leaky valves. Cure is to clean out or replace muffler and tail pipe and improve combustion.

8. *Insufficient Cooling* . . . Caused by scale, rust or muddy deposits in water jackets; failure of water pump to deliver enough water; bad vanes in pump; slipping pump belt. In all cases cleansing or repairing of cooling system is called for.

MAIN CAUSES OF STICKY INTAKE VALVES

Intake valves rarely fail or burn because they are constantly cooled by incoming charge of air-fuel mixture. However, they do frequently stick, due to:

1. *Gum Content of Fuel too High* . . . Gum in fuel forms deposits around valve stem above guide and under valve head. To correct, change to fuel of proper specification.

2. *Worn Guides and Stems* . . . Since most of stem and guide wear is due to dirt and dust in air, remedy is more frequent service of air cleaner, or installation of larger capacity oil bath cleaner and, of course, replacement of worn guides and valves.

RING-FREE MOTOR OIL HELPS REDUCE VALVE TROUBLE

Correction of valve trouble is obviously a mechanic's problem. However, motor oil that penetrates fast—gets down around valve stems, and guides—reduces friction, and thereby prolongs life of valve. Macmillan Ring-Free Motor Oil has this quality of fast penetration. Furthermore, it is refined to withstand high engine temperatures. Ring-Free acts as a preventive for valve sticking, saving fuel consumption and costly repair bills.

FREE BOOKLET

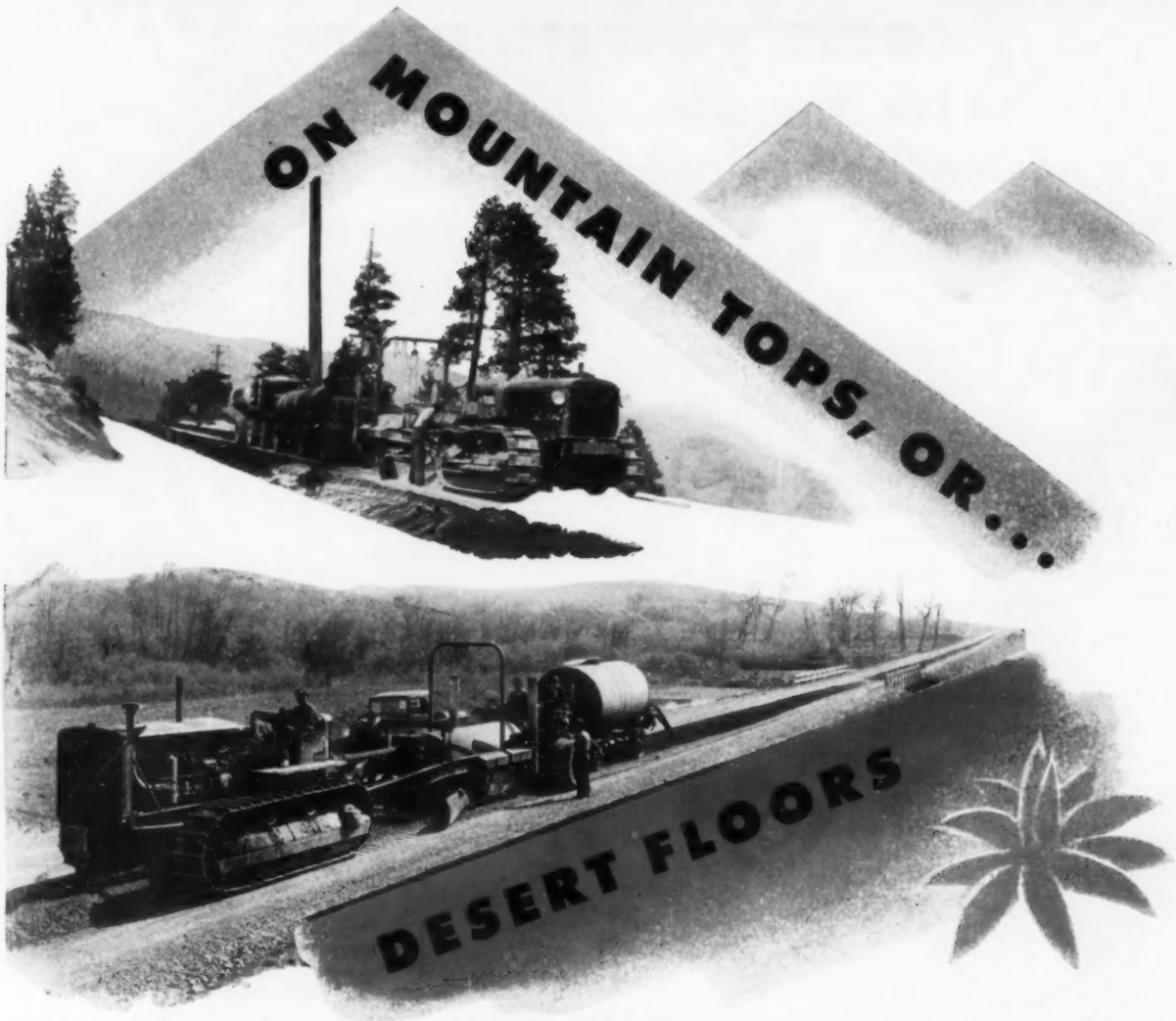
Write today for copy of free pamphlet on "Sticky and Burned Valves—Causes and Preventions." Address—Macmillan Petroleum Corporation, Room 1006, 530 W. 6th Street, Los Angeles 14, Calif.

MACMILLAN RING-FREE MOTOR OIL

MACMILLAN RING-FREE MOTOR OIL

MACMILLAN PETROLEUM CORPORATION—50 WEST 50TH STREET, NEW YORK 20 • 624 SOUTH MICHIGAN AVENUE, CHICAGO 5 • 530 WEST SIXTH STREET, LOS ANGELES 14 • COPYRIGHT 1944, MACMILLAN PETROLEUM CORPORATION

ECONOMY MUST BECOME THE NATIONAL WATCHWORD!



WOOD ROADMIXERS make paving dollars *go farther!*

The Wood Roadmixer is the pioneer and leading travel plant method of rapid, low-cost, high-quality pavement construction. As a traveling mixing plant, it uses low-cost native and local materials, cutting hauling costs to a minimum and saving equipment and labor. Because it handles emulsions, road oils or soil cement, it offers unmatched flexibility in choice of materials and methods. In addition, the Wood Roadmixer produces as high as 2,000 tons of mix per 8-hour day in *one pass.*

More than 100,000,000 square yards of Wood Roadmixer paving in this country and abroad are giving top service under every traffic and climate condition with negligible maintenance costs.

That's why Wood Roadmixers make highway and airport *dollars go farther!* And that's why you should get all the facts about the Wood Roadmixer—a complete traveling mixing plant. Sold by leading equipment dealers everywhere. For literature and prices see your Wood Roadmixer dealer or write direct.

WOOD ROADMIXER

Wood Manufacturing Co. • 816 West 5th St., Los Angeles 13, California

A scientific development that costs you no more

IT'S THE *internal lubrication* IN MACWHYTE PREformed WIRE ROPE

In Macwhyte PREformed Wire Rope, Internal Lubrication increases the life of the rope, thereby reducing operating costs.

A special-formula lubricant made to Macwhyte specifications is force-fed to the wires as they are being closed into the strand.

Macwhyte Internal Lubricant improves the sliding action of the wires as they move in bending around sheaves and drums. In many cases the inside wires are in good condition after the outside wires are seriously worn.

Operators of equipment prefer Macwhyte PREformed Wire Rope because it operates so smoothly and spools on the drum so well.

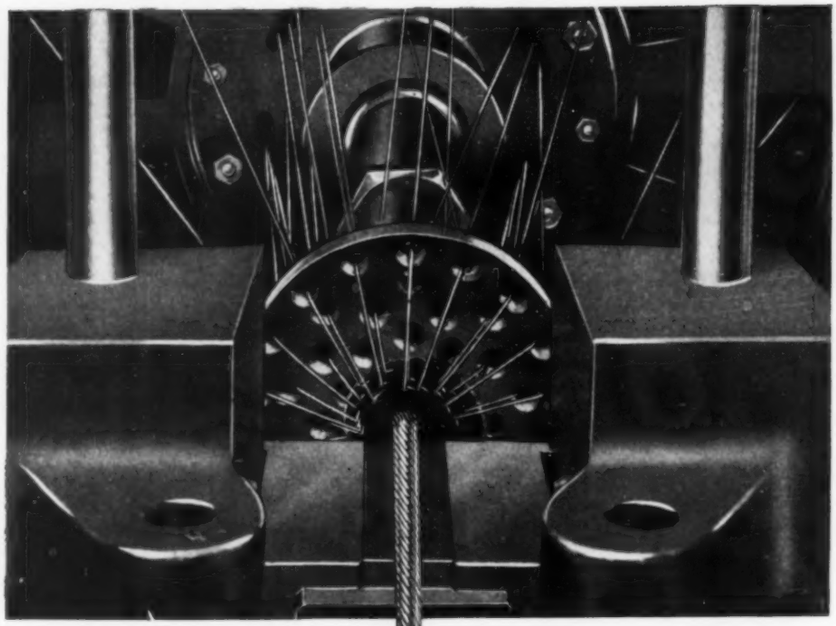
Macwhyte Wire Rope Lubricant is packed around each wire in all strands of Macwhyte Wire Rope.

If you have a service problem, Macwhyte Wire Rope engineers stand ready to give you the benefit of their experience in selecting the proper size, grade, and construction.

The demands of our armed services are so great now, there may be times when we cannot give you our usual prompt service and delivery. The situation changes from day to day so please keep trying to get Macwhyte Wire Rope. We'll serve you if we possibly can.

Rope Conservation Bulletins

18 illustrated articles on the use and care of Wire Rope have been bound into an 8½" x 11" book which is available free to Wire Rope users requesting it on their company letterhead. Ask for Bulletins No. 43-85.



The above illustration shows how internal lubrication is applied to Macwhyte PREformed ropes. *(Top of stranding die is removed.)* Note the wires pass through the lubricant which is pumped up from below and therefore each wire is completely covered and all spaces between the wires in the strand completely filled.

MACWHYTE PREformed WIRE ROPE — Plus Internal Lubrication Selected Steels Tested-Proved

The correct rope for your equipment

NO. 758

MACWHYTE COMPANY

Wire Rope Manufacturers

ARMY E NAVY

2941 FOURTEENTH AVENUE KENOSHA, WISCONSIN

Mill Depots: New York • Pittsburgh • Chicago • Fort Worth • Portland • Seattle • San Francisco. Distributors throughout the U.S.A.

MACWHYTE PREformed and Internally Lubricated Wire Rope — MONARCH WHYTE STRAND Wire Rope — MACWHYTE Special Traction Elevator Rope — MACWHYTE Braided Wire Rope Slings — MACWHYTE Aircraft Cables and Tie-Rods — MACWHYTE Stainless Steel Wire Rope — MACWHYTE Monel Metal Wire Rope

Ever since the first Allis-Chalmers tractor was built over two decades ago, Baker hydraulic bulldozers have been designed and constructed for use with them. From that day to this, there has always been a Baker for every model Allis-Chalmers crawler tractor. Bakers are not adapted to—*they're built specifically for*—Allis-Chalmers tractors. Like salt and pepper, bacon and eggs, or bread and butter—*they go together!*

Baker engineering has kept pace with the progressive improvement of Allis-Chalmers tractors until today the modern Baker bulldozer is the ultimate in serviceful, low cost, easy-to-maintain earth moving equipment. Now, as always, there is a Baker bulldozer and gradebuilder for every model of Allis-Chalmers crawler tractor — described in Bulletin 839. Bakers are sold exclusively by Allis-Chalmers tractor dealers *everywhere.*

THE BAKER MFG. CO.

568 Stanford Ave. Springfield, Ill.

If it Concerns Victory, it concerns us!

"STRAIGHT THROUGH" ASSEMBLY LINE – ALLIS-CHALMERS TO BAKER TO YOU!

The modern Baker plant with its completely equipped fabricating, machining and blacksmithing shops adjoins the Allis-Chalmers crawler tractor plant. When you order an A-C tractor with Baker bulldozer or gradebuilder, your tractor leaves the A-C assembly line, crosses a narrow court and goes on the Baker final assembly line.

TOTAL WAR—ALLIED VERSION

FRANCE — A 15-B shovel loads rock for a crusher.
(Signal Corps Photo)

ENGLAND — A 22-B crane unloads rations.
(Signal Corps Photo)

Fine excavating equipment in the hands of skilled men — the weapon the Axis overlooked — is one of the distinguishing marks of total war, Allied version.

Leaders always, Bucyrus-Eries on all the fighting fronts are adding to the effectiveness of Allied total war. And their outstanding features of design and workmanship will put Bucyrus-Eries in the front ranks of tomorrow's reconstruction.

V-69C

SICILY — A 37-B crane unloads landing mats
(Signal Corps Photo)

SOUTHWEST PACIFIC — A 37-B shovel supplies trucks with aggregate. *(Official Navy Photo)*

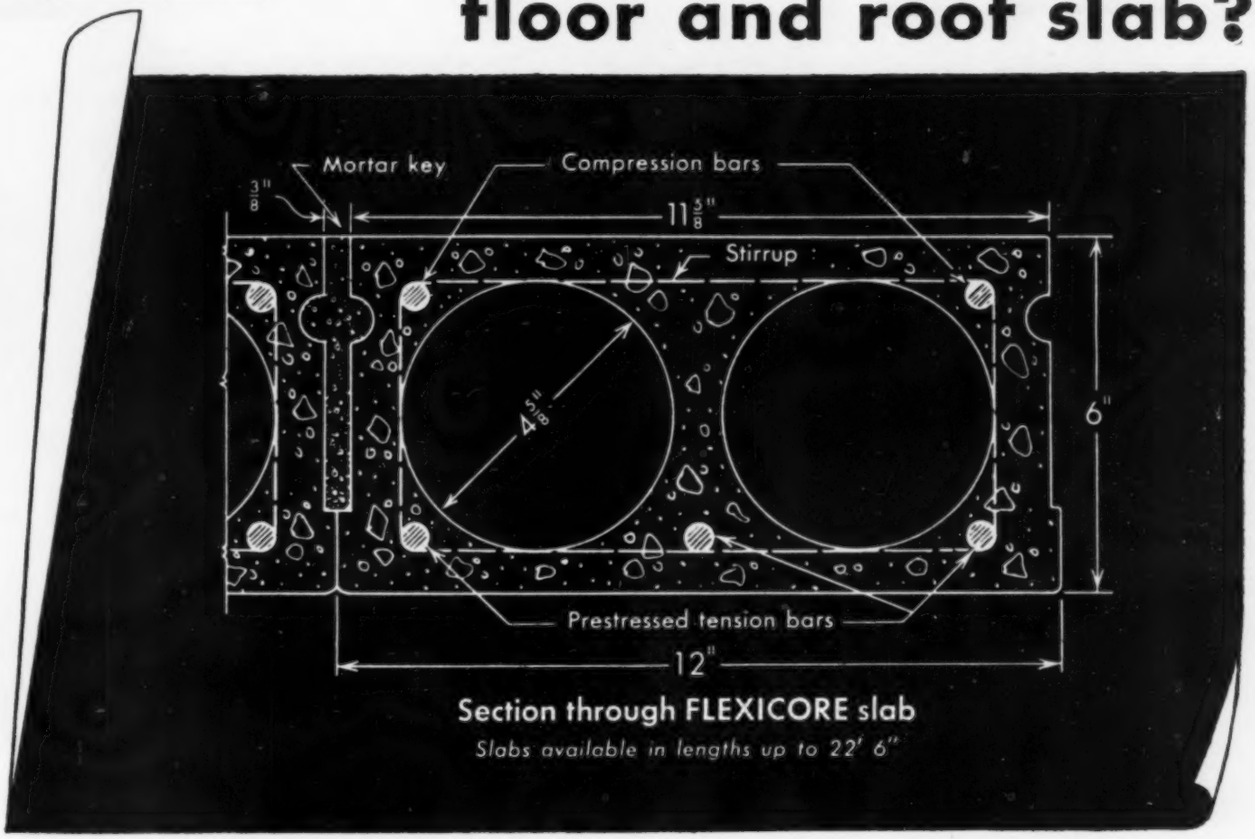
BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

FLEXICORE
FACT FILE NO. 1

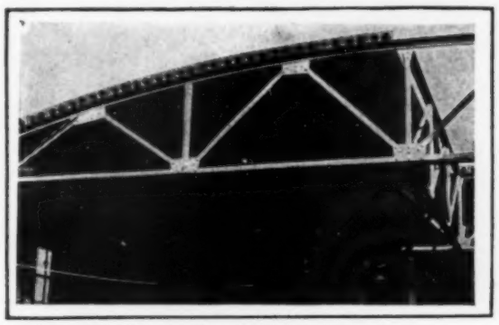
Clip and save for permanent reference. A durable "Fact-File" folder will be furnished free when you send for the new sketchbook on FLEXICORE. Watch for the next "Fact-File" to appear in this publication.

what is flexicore floor and roof slab?



Section through FLEXICORE slab

Slabs available in lengths up to 22' 6"



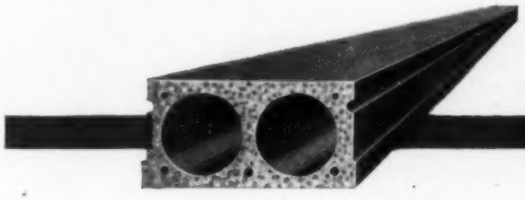
Arched roof showing long FLEXICORE *spans*

In addition to the Dayton plant, FLEXICORE Floor and Roof Slab is made available by: Midwest Concrete Pipe Co., Chicago; Independent Concrete Pipe Corp., Inc., St. Louis; Anchor Concrete Products, Inc., Buffalo; Marietta Concrete Corp., Marietta, Ohio. **Ask about franchise appointments outside the above territories.**

FLEXICORE Floor and Roof Slab is a unique precast, hollow-cast, reinforced concrete unit. Hollow-cast design saves weight, saves material, insulates, fireproofs (D-2 rating) and provides for flexibility in installation of utilities. Prestressing, or application of permanent tension to lower steel reinforcing rods, eliminates concrete shrinkage cracks and increases strength to permit spans up to 22 feet for light load. Standard unit design makes FLEXICORE readily adaptable.

In addition to these structural advantages, FLEXICORE speeds installation... it's precast, precured, easily handled... top side provides level base for any floor covering... underside presents smooth ceiling ready for painting. Although a comparatively new development, *several million square feet of* FLEXICORE *have been installed* in many industrial, commercial, institutional, agricultural and residential buildings. Thousands more square feet are being installed each week.

Send for the Engineers' and Architects' FLEXICORE Sketchbook .... contains the answers to 28 important questions and hand drawn notes ... address Flexicore Division, Price Brothers, Dayton 3, Ohio.

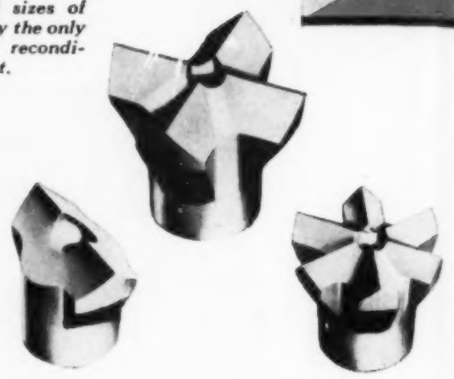


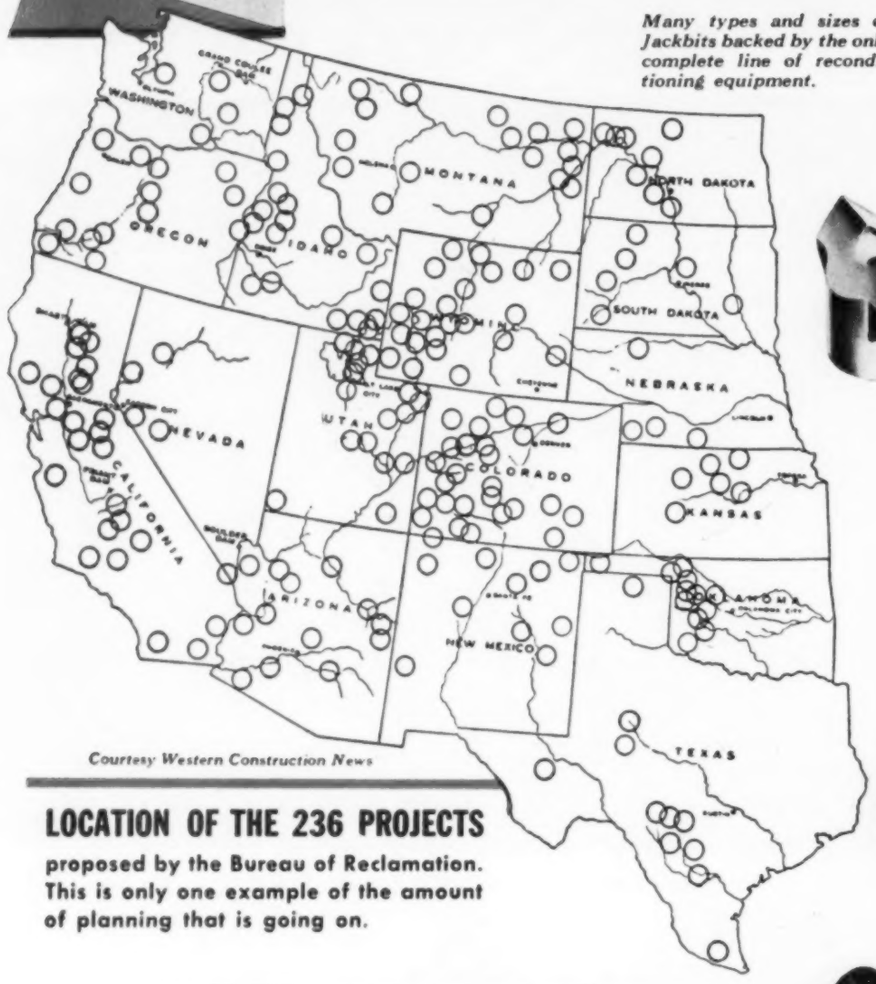
flexicore FLOOR & ROOF SLAB

PRICE BROTHERS CO., DAYTON 3, OHIO

Contractors

Many types and sizes of Jackbits backed by the only complete line of reconditioning equipment.

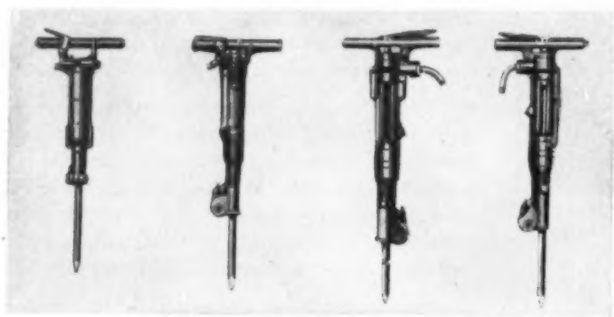




Courtesy Western Construction News

LOCATION OF THE 236 PROJECTS
proposed by the Bureau of Reclamation. This is only one example of the amount of planning that is going on.

A wagon drill which is outstanding for its flexibility and deep-hole drilling power.

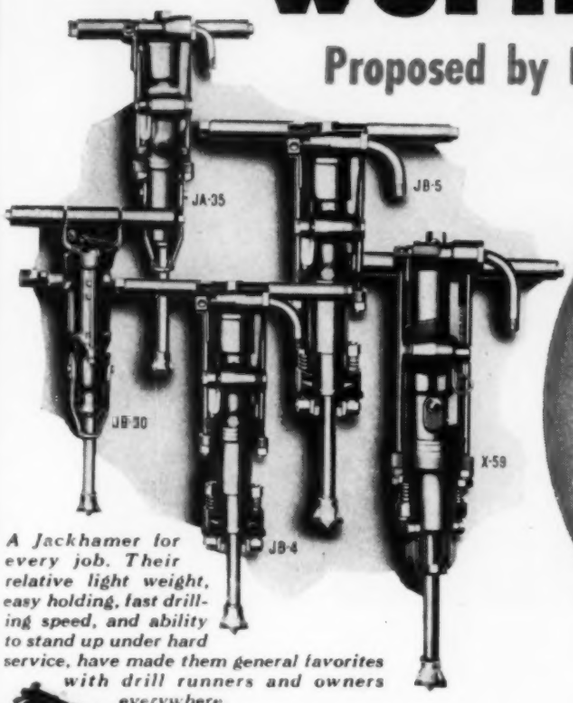


Four sizes of Paving Breakers, including the new Cushioned-Air models which have established records for hitting power and durability.

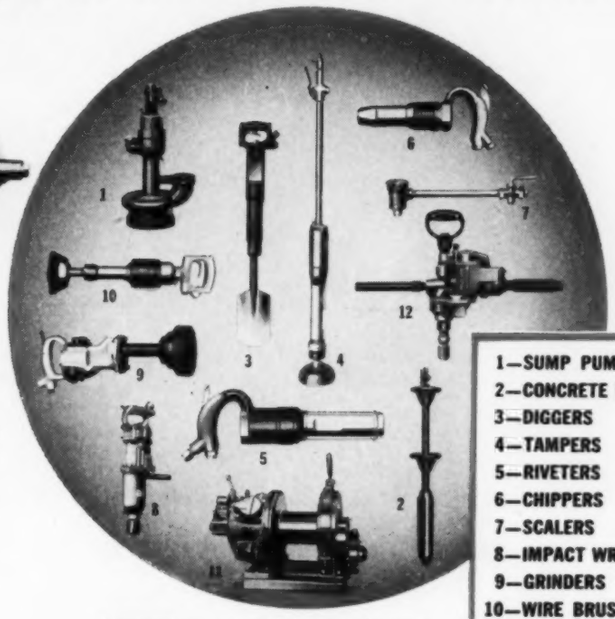
A complete line of portable compressors—60 to 500 cfm—Sizes 105 and up are equipped with Drill-More Regulator which saves up to 40% in fuel consumption.

$3,000,000,000 worth of work

Proposed by Bureau of Reclamation for Post-War



A Jackhamer for every job. Their relative light weight, easy holding, fast drilling speed, and ability to stand up under hard service, have made them general favorites with drill runners and owners everywhere.



A complete line of pneumatic tools which will save you time and money on your miscellaneous, small jobs.

1—SUMP PUMPS
2—CONCRETE VIBRATORS
3—DIGGERS
4—TAMPERS
5—RIVETERS
6—CHIPPERS
7—SCALERS
8—IMPACT WRENCHES
9—GRINDERS
10—WIRE BRUSHES
11—HOISTS
12—DRILLS

Three drifters which have proven their mettle on all the major tunneling jobs throughout the country.

Yes, there's a lot of planning going on. In addition to the above, new highways will be built, flood control projects constructed, city streets modernized, buildings erected, airports provided. Competition will be keener than ever before. You will want the most efficient equipment available.

Here are some of the things Ingersoll-Rand has to offer. In addition, there is available a complete line of compressors up to 3000 hp; pumps with capacities up to 100,000 gpm; Diesel engines, blowers, etc.

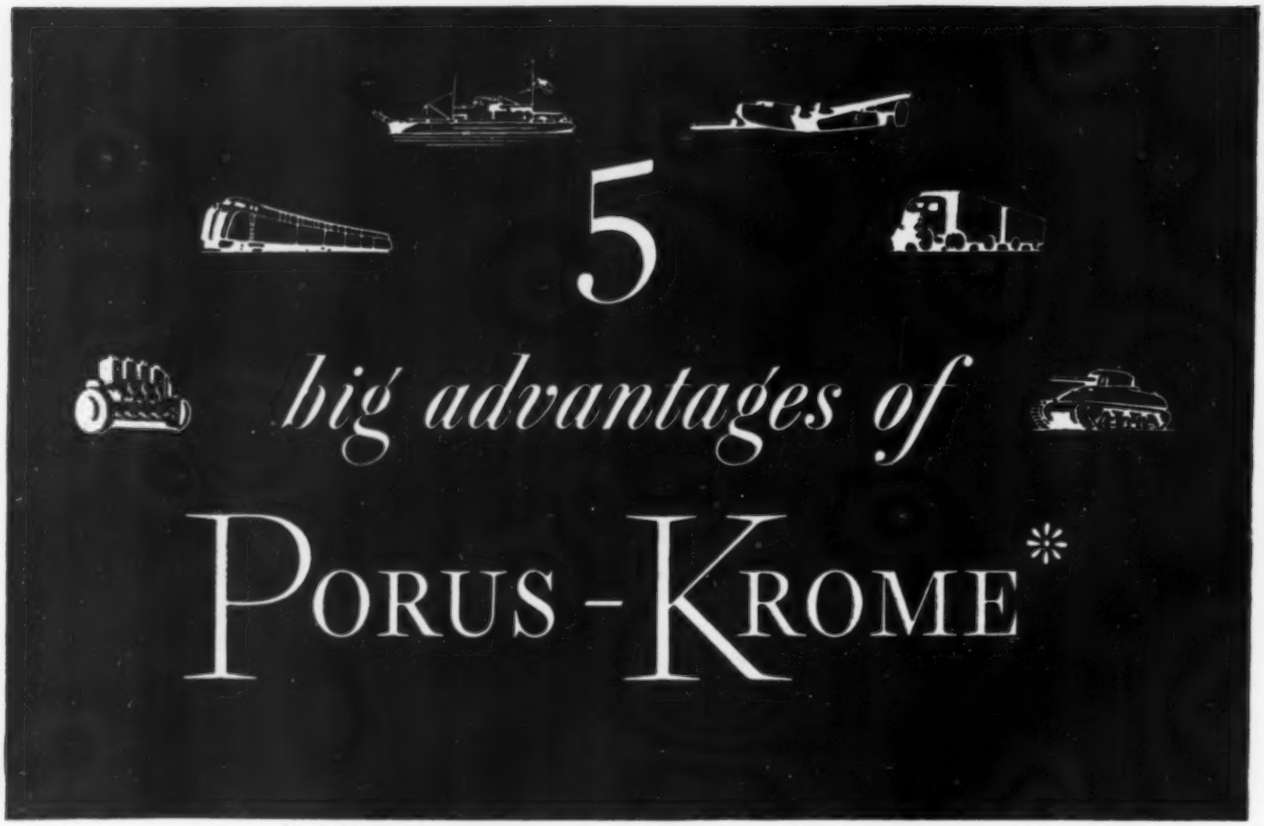
Don't hesitate to ask our service men and engineers for any help you may need. They can show you how the efficiency and dependability built into Ingersoll-Rand equipment will help you make profits on postwar jobs.

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.

14-548

COMPRESSORS • TURBO-BLOWERS • ROCK DRILLS • AIR TOOLS • CENTRIFUGAL PUMPS • CONDENSERS • OIL AND GAS ENGINES



1 PORUS-KROME applied to the cylinder walls of gasoline and Diesel engines multiplies the life of the cylinders from 4 to 20 times.

2 PORUS-KROME on the cylinder walls multiplies the life of the ordinary piston rings from 3 to 5 times.

3 PORUS-KROME, with its thousands of tiny pores and channels which hold lubricating oil and feed it back as needed, improves lubrication and holds lubricating oil consumption at a constant low level.

4 PORUS-KROME and piston rings wear so slowly that high power development is maintained for many more hours . . . many more miles . . . than with ordinary cylinders.

5 PORUS-KROME means greater engine reliability because it reduces scoring and scuffing and the risk of piston seizure and because it cuts down the number of overhauls caused by cylinder and ring wear.

All of these advantages add up to a substantial saving in engine operating costs.

VAN DER HORST

U. S. PATENTS 2,048,578 AND 2,314,604

PORUS - KROME

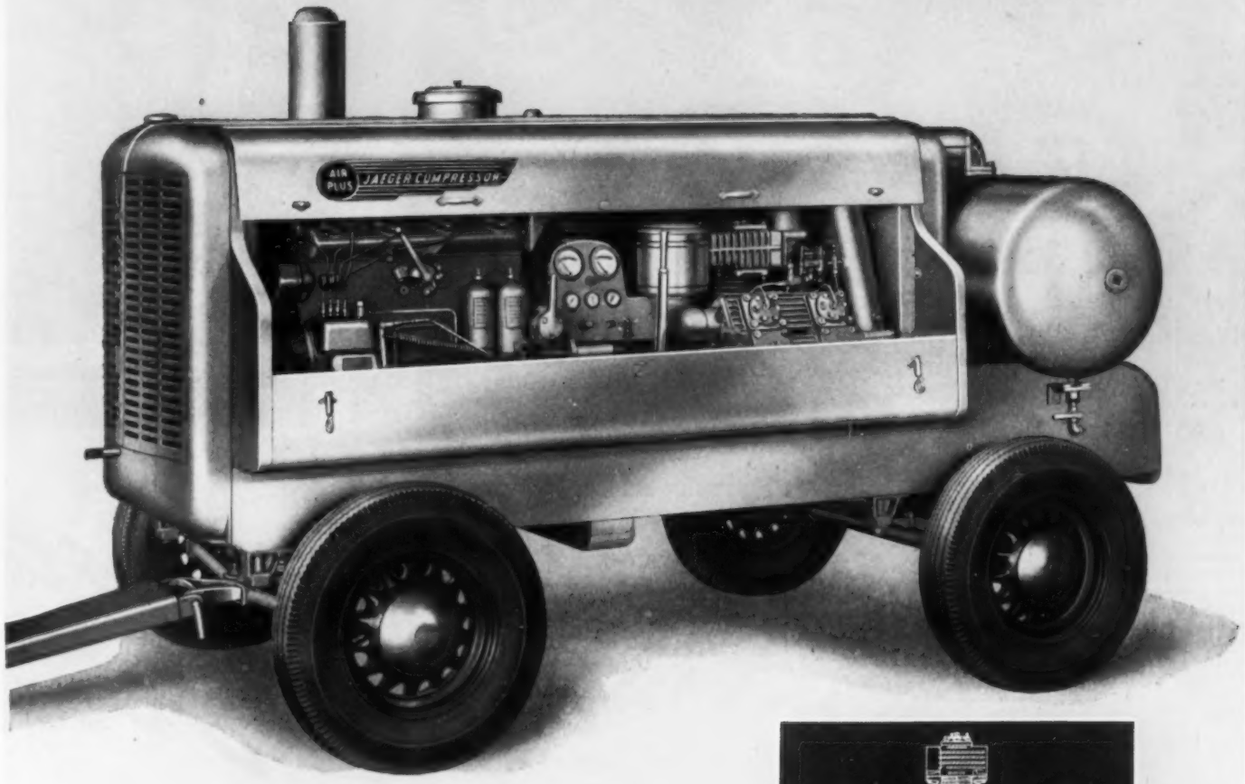
Good for the Life of your Engines

*PORUS-KROME is pure, hard chromium which is applied to cylinder bores by the patented Van der Horst process. It has tiny pores and channels in its surface which serve as reservoirs for lubricating oil, feeding it back as needed. It reduces corrosion and wear and multiplies cylinder life 4 to 20 times.

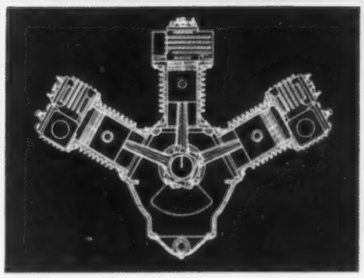
VAN DER HORST CORPORATION OF AMERICA OLEAN • NEW YORK CLEVELAND 11 • OHIO

AN AFFILIATE OF DRESSER INDUSTRIES

AIR PLUS JAEGER COMPRESSOR



BUILT IN A BALANCED "W" TO GIVE YOU S-M-O-O-T-H-E-R PERFORMANCE — COMPLETE ACCESSIBILITY OF EVERY PART



By fundamentally correct design, as well as micro-precision workmanship (parts honed and lapped to aircraft engine tolerances), Jaeger provides the efficiency, stamina and ease of maintenance you have always wanted in air compressors. Identified by the name "AIR PLUS". All sizes, from 60 to 500 feet. . . THE JAEGER MACHINE COMPANY, COLUMBUS 16, OHIO.

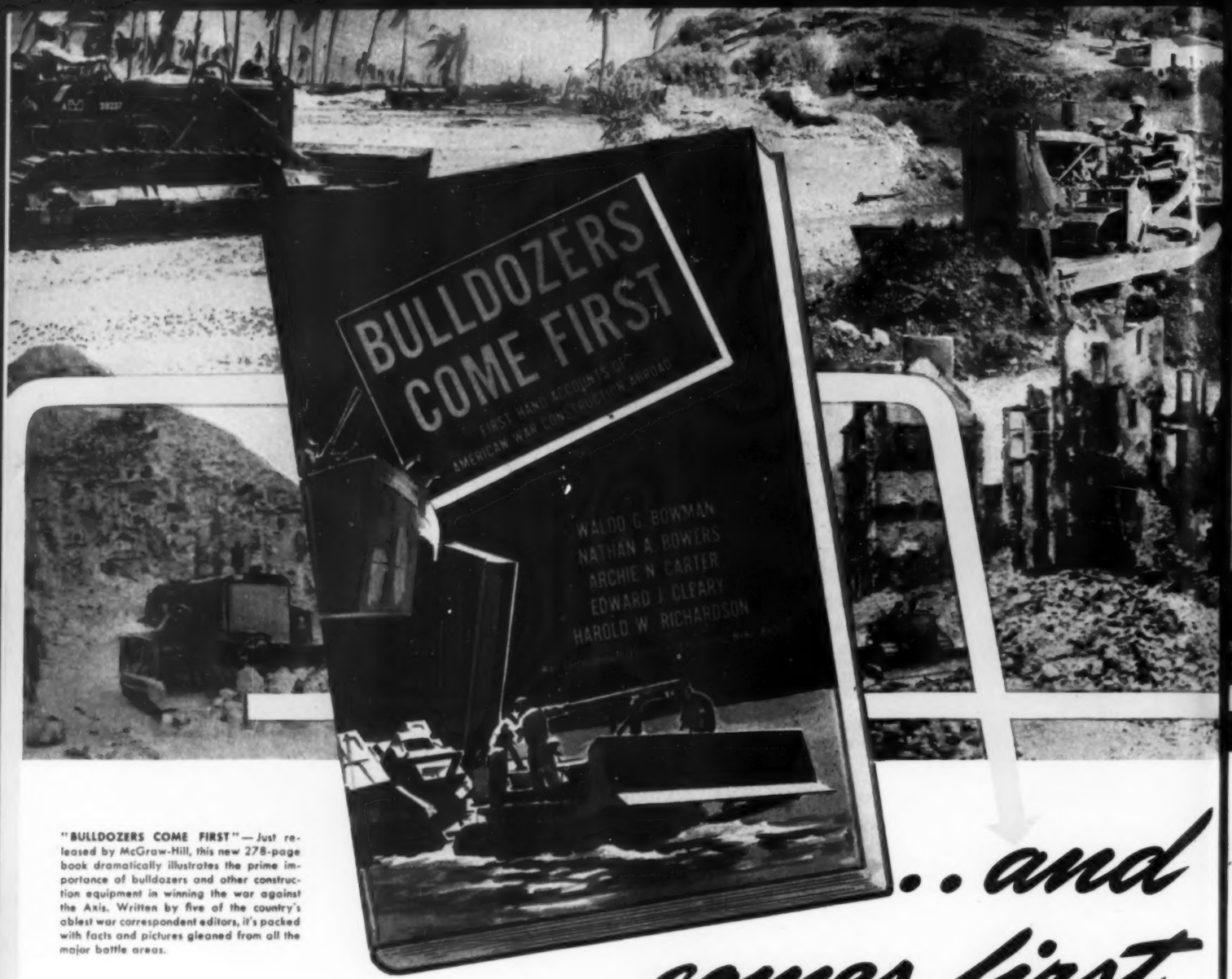
"FLEET-FOOT" Crane-Loaders

"SPEEDLINE" Concrete Mixers

"SURE PRIME" Contractors Pumps

JAEGER *Engineered* EQUIPMENT

JAEGER-LAKEWOOD SPREADERS, FINISHERS AND BITUMINOUS PAVERS, FORMS, FORM TAMPERS—"DUAL-MIX" TRUCK MIXERS, AGITATORS—JAEGER HOISTING ENGINES, TOWERS



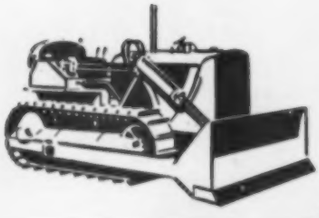
"BULLDOZERS COME FIRST" — *Just released by McGraw-Hill, this new 278-page book dramatically illustrates the prime importance of bulldozers and other construction equipment in winning the war against the Axis. Written by five of the country's ablest war correspondent editors, it's packed with facts and pictures gleaned from all the major battle areas.*

...and comes first

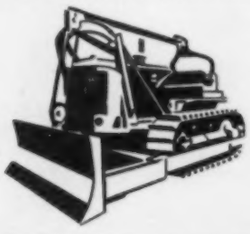
AGAIN IN '44—LaPLANT-CHOATE BUILT MORE DOZERS FOR ESSENTIAL NEEDS THAN ANY OTHER COMPANY

While detailed figures cannot be revealed because of military censorship, 1944 was *the biggest production year in dozer history.* Moreover, again this year LaPlant-Choate built more dozers for the armed forces and essential civilian users than any other company in

BULLDOZERS

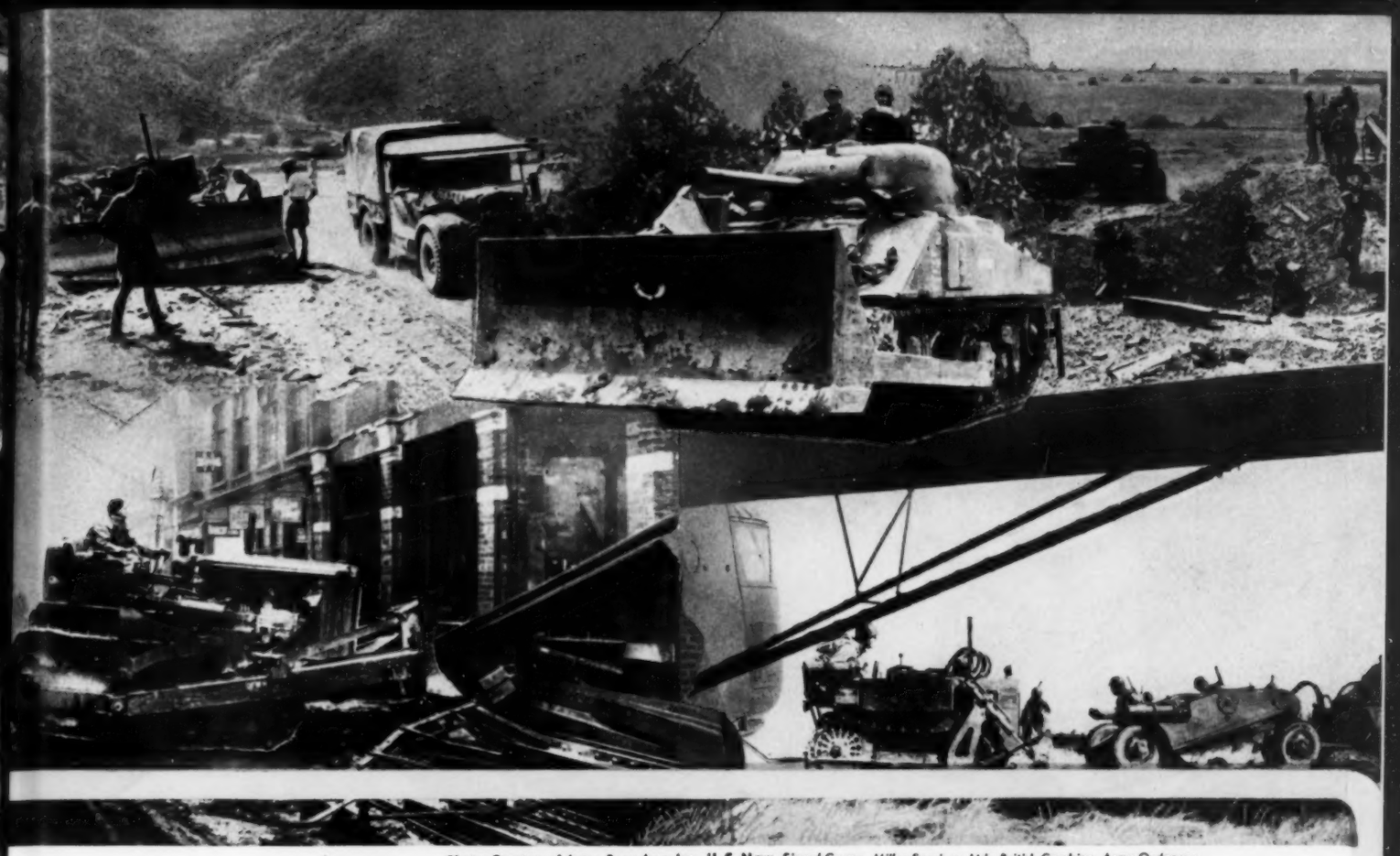


PIVOT-DOZERS* *(Trailbuilders)*



CALF-DOZERS *(Airborne)*

Note the three stars — *LaPlant-Choate is one of the few companies in the construction equipment industry to have won the Army-Navy "E" award*

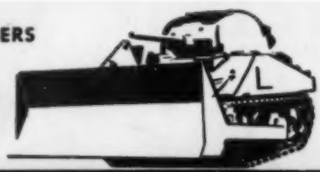


Photos Courtesy of Acme, Press Assn. Inc., U. S. Navy, Signal Corps., Miller Services, Ltd., British Combine, Army Ordnance.

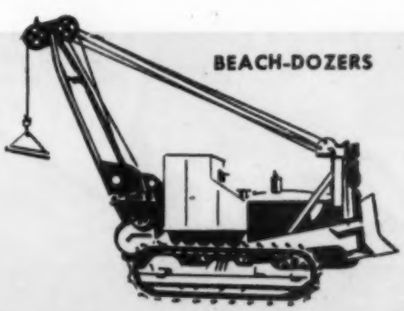
LA PLANT-CHOATE *in Bulldozers!..*

the industry. In addition to thousands of cable and hydraulic operated bulldozers and Pivot-dozers*, LaPlant-Choate developed and built hundreds of highly specialized engineer units—including the now famous Tank-dozer, the Beach-dozer and the small airborne Calf-dozer. This record-breaking production, plus LaPlant-Choate's *21 years of "know-how" in dozer engineering is your* best assurance of tomorrow's best buys in dozer equipment. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa.

TANK-DOZERS



BEACH-DOZERS

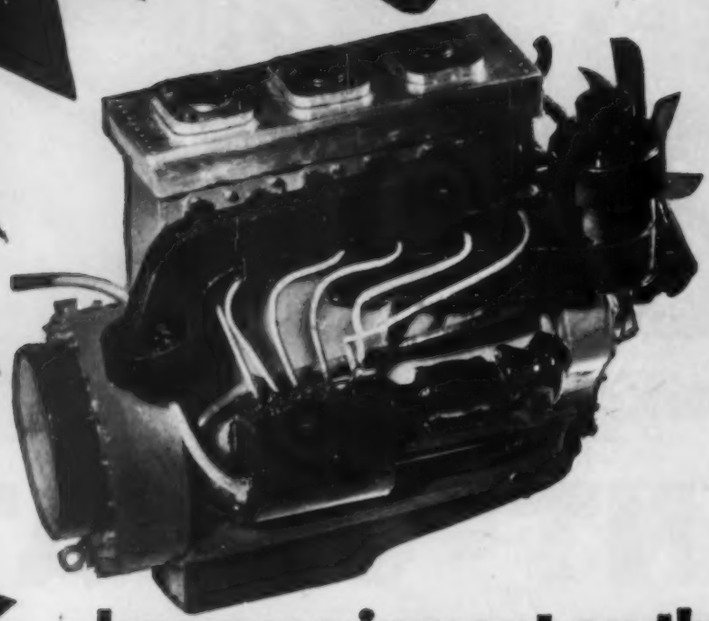


LaPLANT-CHOATE

America's Oldest and Largest Manufacturer of Dozers

*Trade-mark applied for

Don't let a "LAZY" oil SMASH your Diesels...



...keep equipment on the "Go" with hard-working TALPEX

IT doesn't take long for a "lazy" oil to put an engine out of commission. How can you tell a "lazy" oil from a hard-working lubricant? You can't until the damage is done. For while a "lazy" oil may *look* like other oils, it doesn't act like one. It doesn't have the "staying" qualities to resist corrosion . . . the formation of carbon, sludge, lacquer.

A "lazy" oil may have *some* of the properties necessary to efficient engine operation. But that's not enough. To do a job of lubrication in today's overworked engines an oil must have *all* of the following properties of Shell Talpex.

NEW SHELL TALPEX

— **IS NON-CORROSIVE** to alloy bearings. Protects all lubricated engine parts against corrosion.

— **HAS EXCEPTIONAL OXIDATION STABILITY.** Holds to a minimum the formation of sludge, lacquer and other products of deterioration.

— **HAS HIGH DETERGENCY.** Helps keep carbon, lacquer and foreign particles from adhering to pistons and rings, valves, ports.

— **HAS LOW CARBON-FORMING TENDENCY.** Reduces ring sticking and wear. Lengthens engine life.

If the oil you now use doesn't have *all* these properties, it's lazy . . . should be changed to hard-working Shell Talpex. Ask the Shell man to show you why.

SHELL

TALPEX

THE NEW, ALL-PURPOSE, HEAVY-DUTY LUBRICANT

For trucks, busses, tractors, shovels, stationary and marine Diesels

In the heart of the South, a Moretrench Wellpoint System makes the digging dry — and easy.

The Season's Greetings

and a prayer that 1945 will herald

Peace on Earth

Good Will Toward Men

MORETRENCH CORPORATION

90 WEST STREET, NEW YORK 6

CHICAGO, ILL. ROCKAWAY, N. J. NEW ORLEANS, LA.

SOUTHWEST Hauling Scoop

SINGLE CABLE CONTROL

Here it is—the first rear dump hauling scoop with *single cable control!* No longer is it necessary to have hydraulic equipment to have a rear dump unit. Southwest does it with the single cable control. And here are some of the advantages: Dumps safely over embankments—Works well in difficult places—Dumps while moving forward, backward or standing still—Shortens operational cycles by *controlled* spreading. Sturdy design and construction to handle tough jobs easily. Ideal for road maintenance and repair.

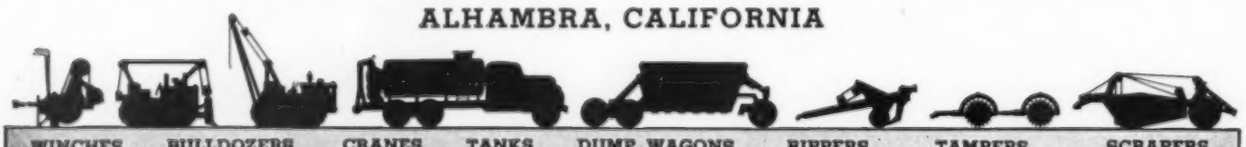
Four page bulletin available on request. Gives engineering data on the three standard sizes of Southwest Hauling Scoops. Write Department A130 Southwest Welding & Manufacturing Company, Alhambra, California.

The Southwest Single Cable Control Scoop can be operated by a single drum or as a "dozer scoop" combination with double drum unit.

CONSTRUCTION MACHINERY DIVISION

Southwest Welding & Manufacturing Co.

ALHAMBRA, CALIFORNIA



WINCHES BULLDOZERS CRANES TANKS DUMP WAGONS RIPPERS TAMPERS SCRAPERS

EXTRA RUGGEDNESS Where It Counts Most

Built for long life and heavy duty from the ground up, Michigan has all the extra ruggedness necessary where it counts most. For example, notice illustrations at left. And these are only two examples of Michigan's superior features. Exceptional mobility, with road speed up to 30 MPH—quick, easy convertibility to shovel, crane, clam, dragline or trench hoe—air controls that save time between jobs and on the job—all are equally important. Made in 3/8 and 1/2 yard sizes. Write for Bulletin CM-124.

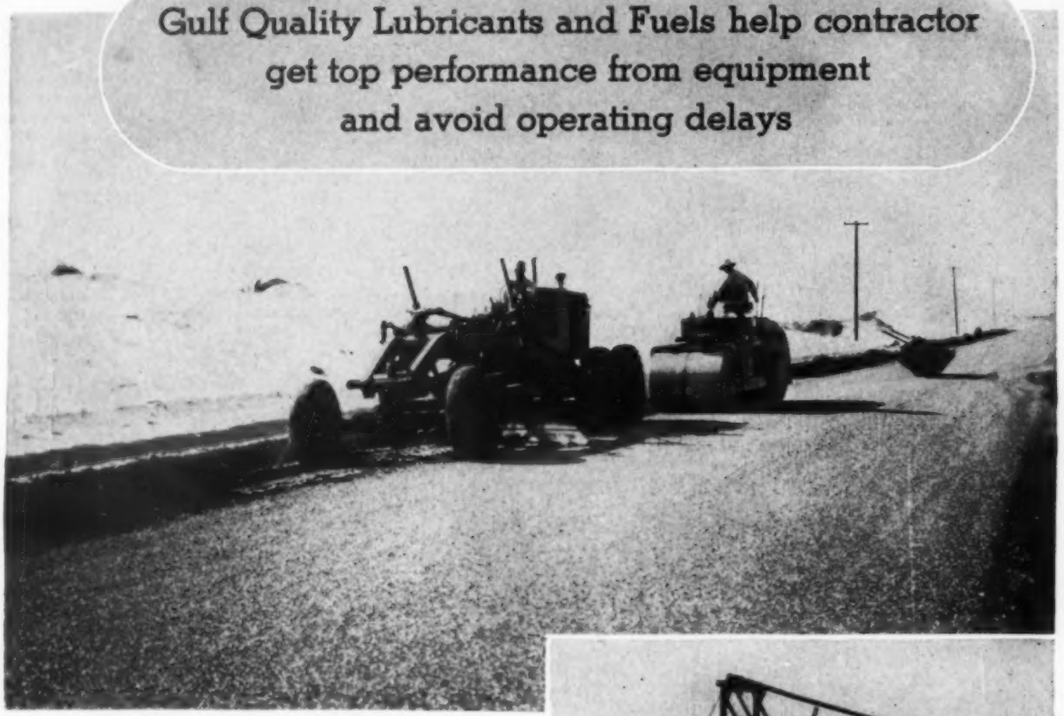
Above: One-piece alloy steel circle gear and center post for maximum strength.

Left: Rollers, operating on top and bottom circle gear paths, remove strain from center pin.

MICHIGAN
POWER SHOVEL COMPANY
BENTON HARBOR, MICHIGAN

Airport road project 2 weeks ahead of schedule—

Gulf Quality Lubricants and Fuels help contractor get top performance from equipment and avoid operating delays



James H. Craggs Construction Company, Ocala, Florida, is 2 weeks ahead of schedule in grading and paving roadway between Fernandina Beach and Fernandina Airport, Florida. Grading involved 90,000 cu. yds. of earth. Gulf quality petroleum products used on this job include Dieselube H. D., Transgear Lubricant E. P., Solar Fuel Oil and Good Gulf Gasoline.

"OUR equipment has made an outstanding record on this job with Gulf lubricants and fuels in service—one of the important reasons we're 2 weeks ahead of schedule," says Superintendent R. V. Fitzgerald. "Proper lubrication and efficient fuel performance have helped us get the most out of each unit and avoid operating delays—which means more work done on every shift."

The progress and profit on any dirt-moving or paving job depend to a large extent on the efficiency of the equipment that does the work. That is why many leading contractors use Gulf quality lubricants and fuels as basic job insurance—they know from experience that equipment performs better, stays on the job longer, and operates at lower expense for maintenance.

Gulf quality lubricants and fuels are quickly available to you through more than 1200 warehouses located in 30 states from Maine to New Mexico. Write, wire, or phone your nearest Gulf office today.

GULF

GULF OIL CORPORATION
GULF REFINING COMPANY
GULF BUILDING, PITTSBURGH 30, PA.

9 DR 30's on this JOB!

Pneumatic tires can be had if specified by purchaser in his application for priority to Construction Machinery Branch of War Production Board.

• Plenty of rock here! So husky, maneuverable Cleveland DR 30 Wagon Drills were used to good advantage at this large, west coast naval base.

Here are 7 REASONS why the DR30

IS THE MOST POPULAR WAGON DRILL EVER BUILT:

1. They drill at *any* angle and in *any* direction, flat holes from 4" to 8' aboveground, also straight up or down.
2. Feed capacity is over 8 feet, and the Cleveland DR 30 handles depths to over 25 feet.
3. The recoil device holds machine to its work, and increases the drilling speed from 10 to 25%.
4. Forward leg point holds the drill and steel in line whether operating in down, flat or angle holes.
5. Centralizer keeps steel from "walking" when starting hole, prevents breakage of bit points.
6. The twin jack-screw mechanism permits easy moving of U-bar, and also shortens set-up time.
7. The main wheels swivel 90° for line drilling, and 180° in order to obtain narrower tread.

Ask for Bulletin 132

BACK THE ATTACK—BUY MORE WAR BONDS

LEADERS IN DRILLING EQUIPMENT

THE CLEVELAND ROCK DRILL CO.

DIVISION OF THE CLEVELAND PNEUMATIC TOOL COMPANY

CABLE ADDRESS: "ROCKDRILL" • CLEVELAND 5, OHIO

BRANCH OFFICES

Birmingham, Ala.	Dallas, Texas	Los Angeles, Calif.	Salt Lake City, Utah
Boston, Mass.	Denver, Colo.	Milwaukee, Wis.	San Francisco, Calif.
Buffalo, N. Y.	Detroit, Mich.	New York, N. Y.	St. Louis, Mo.
Butte, Mont.	El Paso, Texas	Philadelphia, Pa.	Wallace, Idaho
Chicago, Ill.	Ironwood, Mich.	Pittsburgh, Pa.	Washington, D. C.
Cincinnati, Ohio	Lexington, Ky.	Richmond, Va.	

CANADIAN DISTRIBUTORS

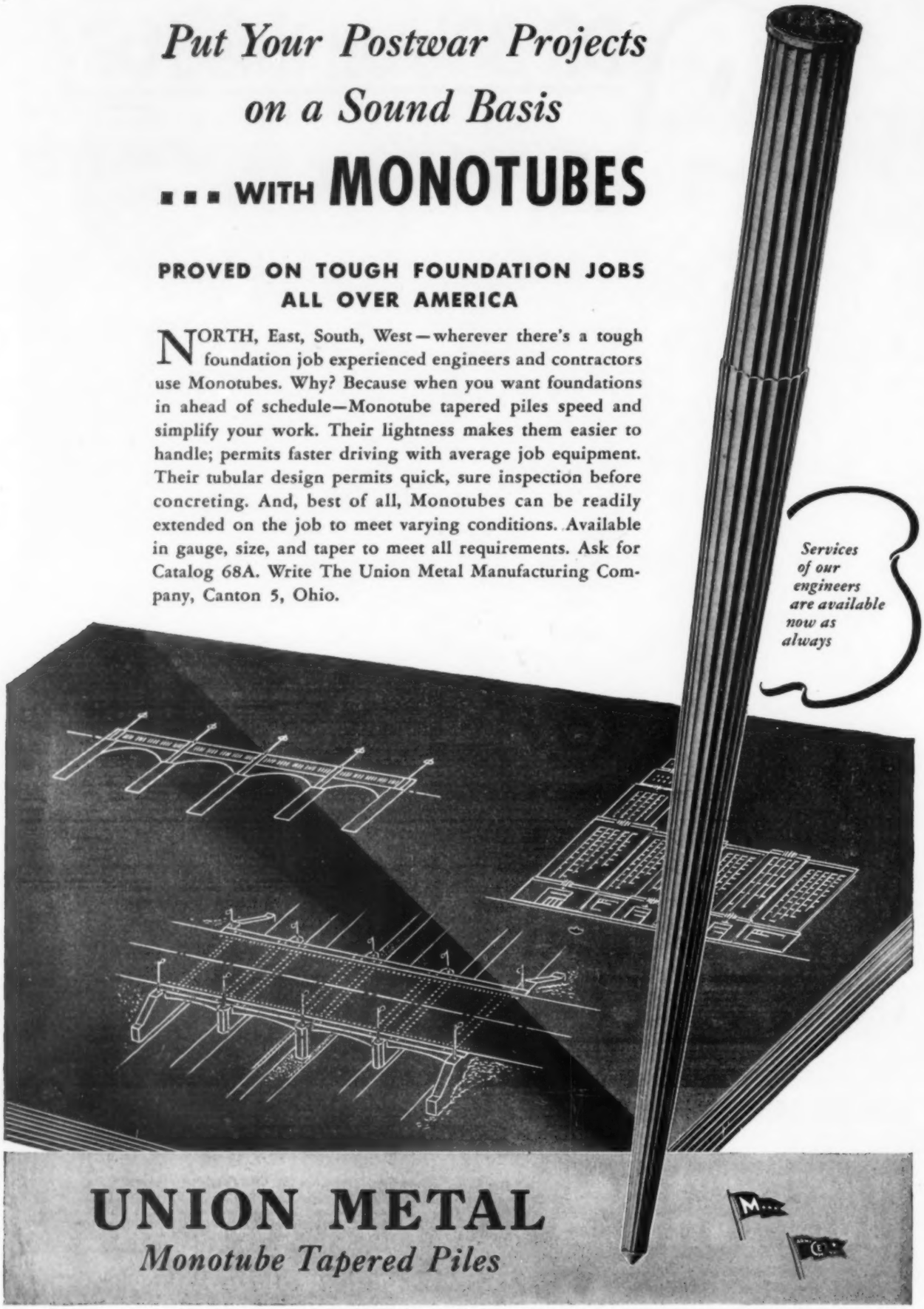
Purves E. Ritchie & Son, Ltd., 658 Hornby Street, Vancouver, B. C.

Put Your Postwar Projects on a Sound Basis

... WITH MONOTUBES

PROVED ON TOUGH FOUNDATION JOBS ALL OVER AMERICA

NORTH, East, South, West—wherever there's a tough foundation job experienced engineers and contractors use Monotubes. Why? Because when you want foundations in ahead of schedule—Monotube tapered piles speed and simplify your work. Their lightness makes them easier to handle; permits faster driving with average job equipment. Their tubular design permits quick, sure inspection before concreting. And, best of all, Monotubes can be readily extended on the job to meet varying conditions. Available in gauge, size, and taper to meet all requirements. Ask for Catalog 68A. Write The Union Metal Manufacturing Company, Canton 5, Ohio.



Services of our engineers are available now as always

UNION METAL

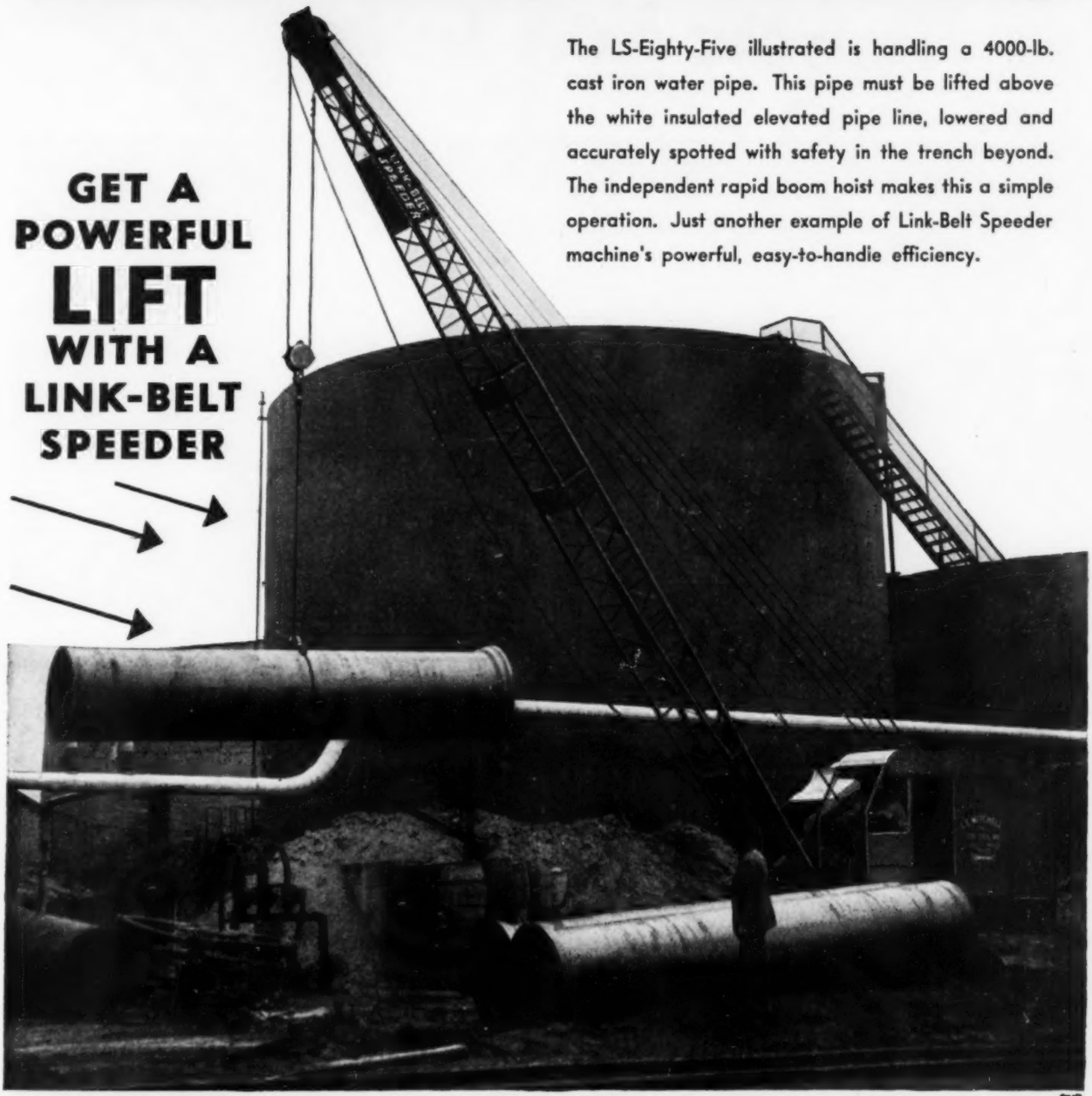
Monotube Tapered Piles

LINK-BELT SPEEDER

LIFTING AND BALANCING A 4,000 LB. PIPE MADE EASY!

GET A POWERFUL LIFT WITH A LINK-BELT SPEEDER

The LS-Eighty-Five illustrated is handling a 4000-lb. cast iron water pipe. This pipe must be lifted above the white insulated elevated pipe line, lowered and accurately spotted with safety in the trench beyond. The independent rapid boom hoist makes this a simple operation. Just another example of Link-Belt Speeder machine's powerful, easy-to-handle efficiency.



9747

LINK-BELT SPEEDER

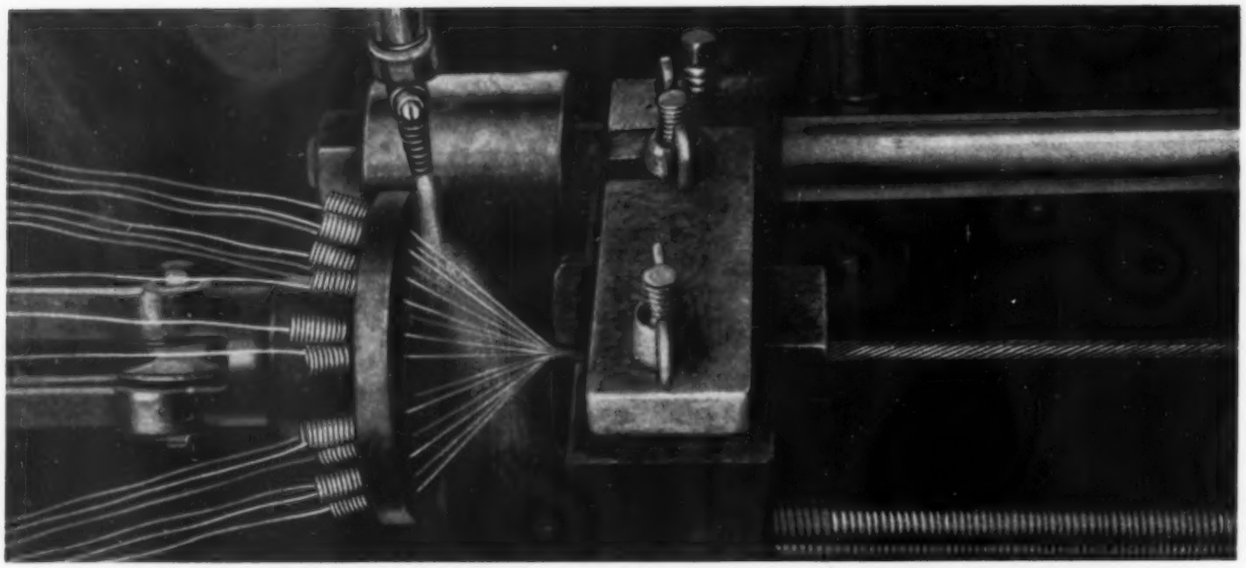
Builders of the Most Complete Line of

SHOVELS-CRANES-DRAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO 9, ILL.

A DIVISION OF LINK-BELT COMPANY

The Lubricant Bath that makes Upson-Walton Wire Rope give Better Service



EVERY wire in any length of Upson-Walton wire rope —and there may be 200 or 300 of them—is a *live* wire in the sense that *all are in motion when the rope is operating.* Every time the rope flexes, every wire in it moves.

Upson-Walton pre-lubrication therefore is of crucial importance to:

1—Prolong the life of the rope

2—Retard corrosion

3—Reduce friction within the rope itself and thereby prevent excessive wear, wire on wire and strand on strand.

Every foot of Upson-Walton wire rope is subjected to a pressure bath of lubricant, actually built into the rope in manufacture. By this method (illustrated above), every wire in every strand is surrounded with lubricant; every void between strands is a reservoir of lubricant and the core itself is *saturated* with lubricant.

The practical effect of pre-lubricating, as performed by Upson-Walton, is this:

1—It permits a better balanced loading of the rope.

2—Weight is distributed more equally between *all* wires; no one wire bears an excessive share of the load.

3—Every wire helps hold the load by easily slipping into the position where it helps the most.

4—The rope can develop its full maximum strength and sustain greater loads than rope which might not be as efficiently pre-lubricated.

It pays to specify Upson-Walton wire rope—*with the built-in lubrication system.*

U-W

Established 1871

Upson-Walton also manufactures wire rope clips, thimbles and sockets; tackle blocks, snatch blocks, turnbuckles and shackles

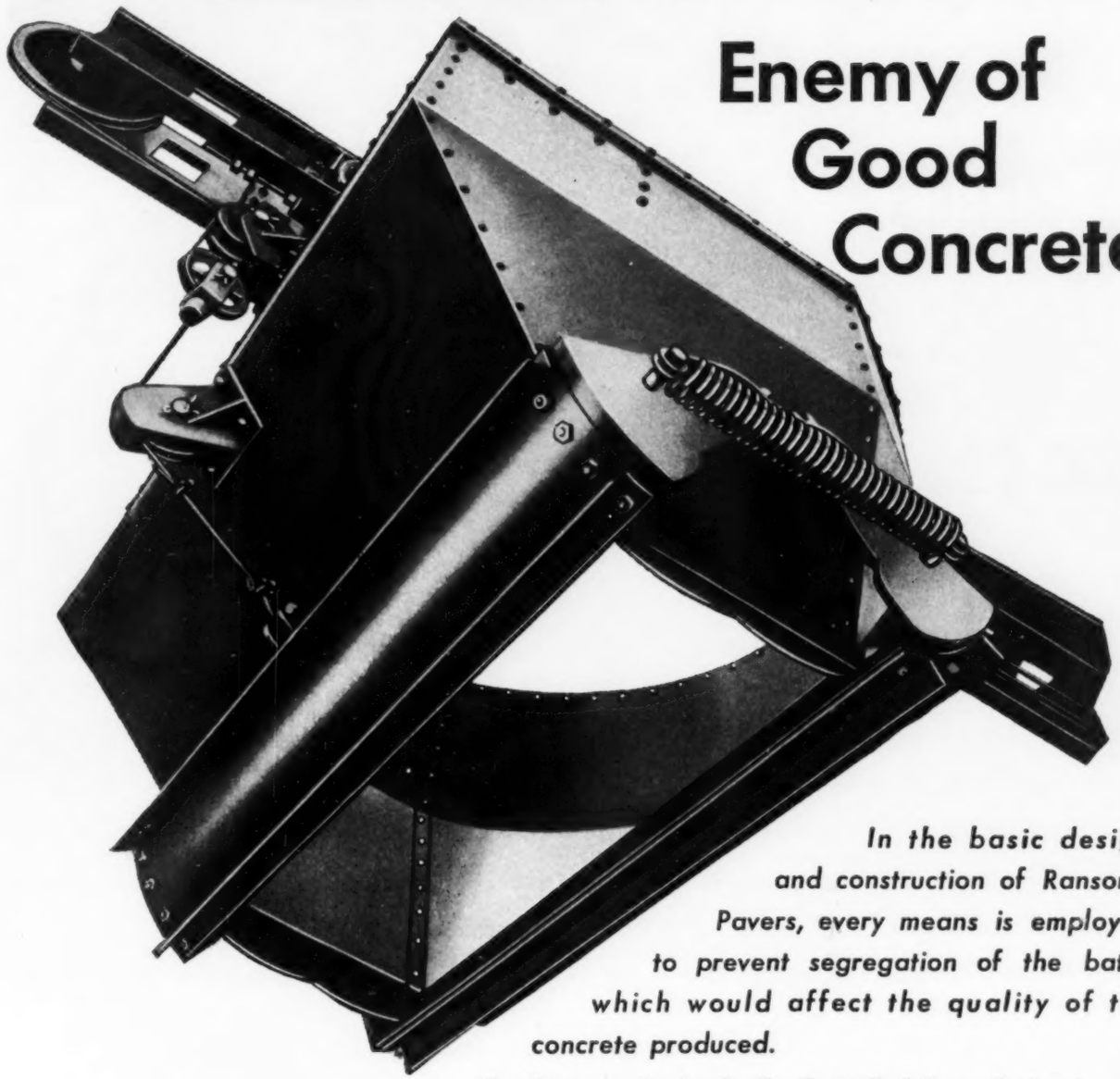
THE UPSON-WALTON COMPANY

Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks

NEW YORK • PITTSBURGH • CLEVELAND • BUFFALO • CHICAGO

SEGREGATION...

Enemy of Good Concrete



In the basic design and construction of Ransome Pavers, every means is employed to prevent segregation of the batch which would affect the quality of the concrete produced.

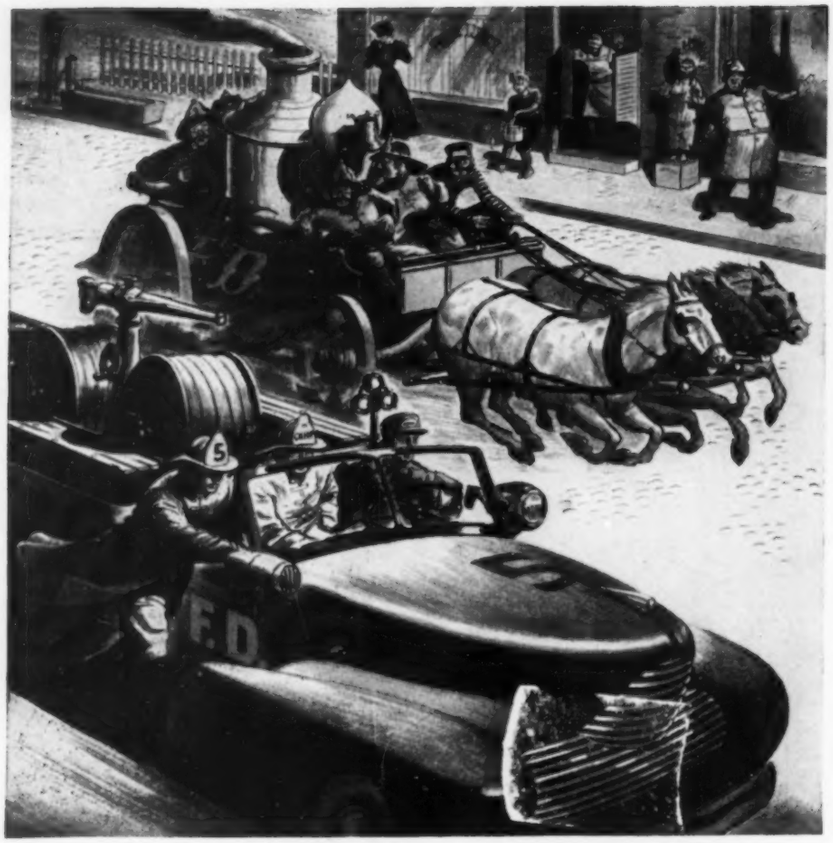
The Ransome Hydraulically Controlled Boom Bucket is provided with gates that slide out of the path of the concrete when the bucket is discharging, giving it full unimpeded flow to the subgrade. The bucket gates can be opened to any degree permitting good spreading action, or dumping of part of the load thus eliminating split batches.

This is but one of many important features found only on Ransome Pavers. On your next paving job, use a Ransome. . . . We will be glad to give more reasons why you should.

RANSOME 34E SINGLE AND DUAL DRUM PAVERS ARE HYDRAULICALLY CONTROLLED!

CONSTRUCTION EQUIPMENT DIVISION **Ransome MACHINERY COMPANY**
DUNELLEN, NEW JERSEY
SUBSIDIARY OF WORTHINGTON PUMP AND MACHINERY CORPORATION

THERE'S BEEN A BIG CHANGE



★ The dapple grays have disappeared from Main Street. More efficient, motorized equipment has taken over the job of fighting fires.

Tapered roller bearings have been improved, too—made more efficient by Tyson's "All-Rolls" design. Tyson's extra load-carrying rollers mean added capacity—longer bearing life—maximum rigidity.

In transportation, industry, agriculture—wherever the going is tough—Tyson's unusual performance is a matter of record.

The big name in bearings today is . . . **TYSON!**

TYSON BEARING CORPORATION, MASSILLON, OHIO

COUNT THE ROLLS · THE ROLLS COUNT

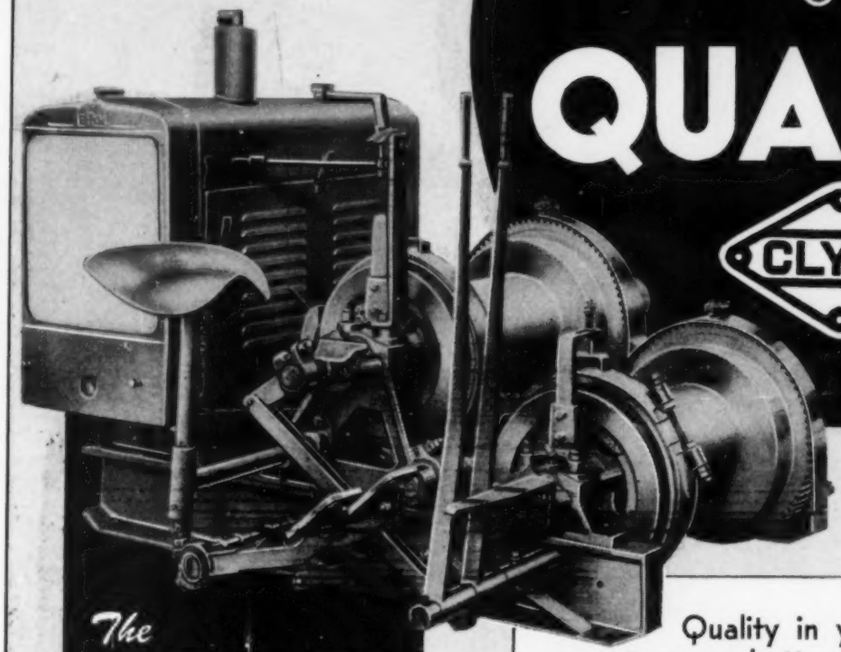
Tyson

TODAY'S HEAVY-DUTY BEARING

★ **KEEP ON BUYING WAR BONDS** ★

The SYMBOL of QUALITY

CLYDE



The
CLYDE LINE
of
QUALITY EQUIPMENT

- HOISTS
- DERRICKS
- WHIRLEYS
- CAR PULLERS
- HAND POWERS
- BUILDERS TOWERS
- MINE HOISTS
- WINDLASSES
- WINCHES
- PILE DRIVERS
- BARGE & DREDGE MACHINERY

Quality in your hoisting equipment means better production, greater safety and less maintenance expense.

Clyde products are quality products . . . the result of over 45 years of pioneering, improving and perfecting machinery for the contractor, industrial plant owner and material handling operator.

Every unit is carefully and practically engineered . . . every piece is accurately made to provide long and efficient performance.

Consider the many advantages to you gained by using Clydes on your jobs. Write for a bulletin on any type of equipment in the Clyde line . . . they contain detailed information and complete specifications.

ARMY E NAVY

CLYDE IRON WORKS, INC.
DULUTH, 1 MINNESOTA

Heavy hauls really ROLL on this TIME-PROVED TOUGHER TREAD

GOODYEAR ALL-WEATHER EARTH-MOVERS keep this LaPlante-Choate CARRIMOR working fully up to its name.

MORE AND MORE contractors now buy Goodyear All-Weather Earth-Movers for drawn units because they know that this great work tire gives them maximum flotation — keeps their *heaviest* loads moving free and fast.

That's because the rugged, job-proved All-Weather tread of this BIGGER tire extends over the shoulders *to the center of the sidewalls* —provides side traction, prevents side-slip on grades.

Its wider tread channels and rounded, sturdy diamonds assure complete self-cleaning and protection against snagging. And its tougher bead construction provides security against rocking, chafing and rim cutting.

Now super-armored with Goodyear's patented Rayotwist cord—*the strongest body we've ever used in a work tire*—these Goodyear off-the-road giants are by far the finest that can be built from synthetic and permissible natural rubber available today. They deliver more ton-miles of heavy-duty service because they are the longest-lasting, hardest-working tires available.

For proof of that, talk to the men now using them. Once you do, you will want Goodyears on all your units.

BUY WAR BONDS—BUY FOR KEEPS

THE RIGHT TIRE FOR EVERY JOB
Rayotwist-armored for extra strength

for drive wheels, Goodyear's

O-P-E-N C-E-N-T-E-R

self-cleaning tread gives more pull, more traction

ALL-WEATHER EARTH-MOVER for drawn vehicles
HARD ROCK LUG for all rock work
SURE-GRIP for drive wheels

PRODUCTS OF GOODYEAR RESEARCH

All-Weather, Rayotwist, Sure-Grip—T.M.'s The Goodyear Tire & Rubber Company

GOODYEAR

THE GREATEST NAME IN RUBBER

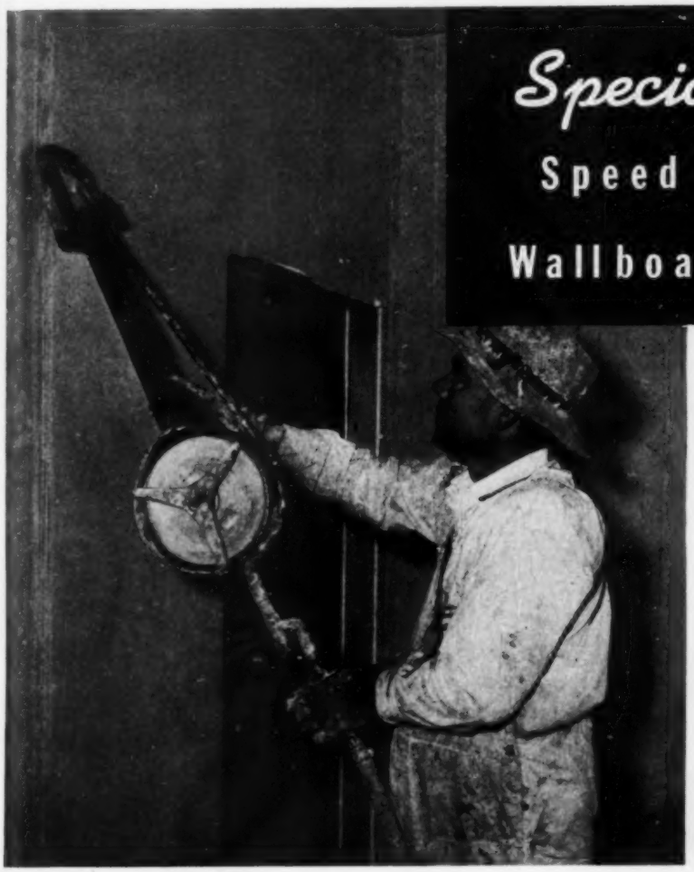
MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

Construction Methods

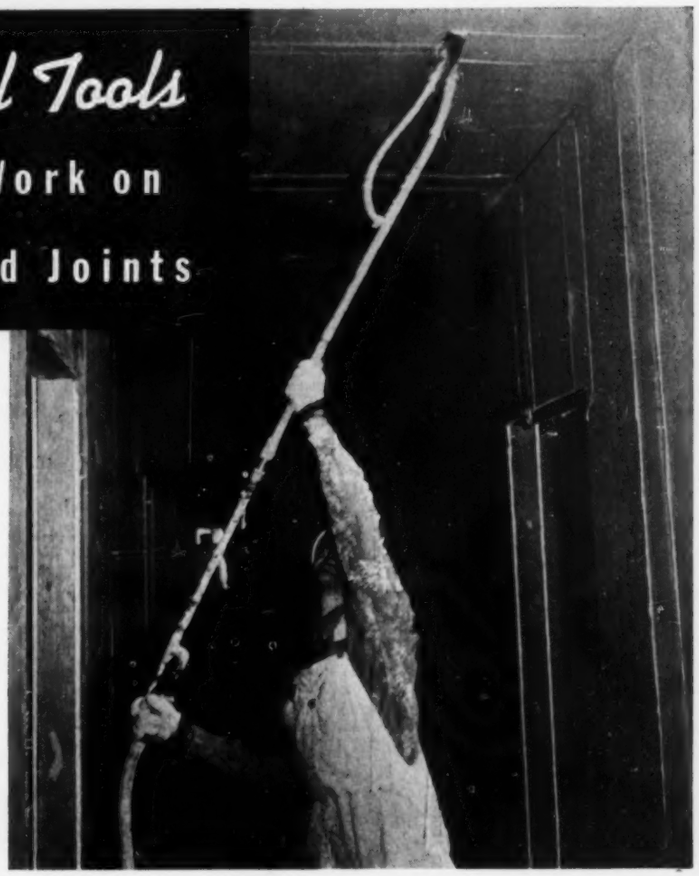
ROBERT K. TOMLIN, Editor

Volume 26 — DECEMBER, 1944 — Number 12

Special Tools Speed Work on Wallboard Joints



MASTIC AND TAPE are applied to wallboard joint simultaneously by one tool. Compressed air forces flow of mastic through tube from pressure pot and tape is unwound from reel as tool is drawn over joint.



TOPPING TOOL with long handle finishes ceiling joint without necessity of scaffolding.

TWO INGENIOUS TOOLS developed during the recent construction of the huge Dibble General Hospital at Menlo Park, Calif., are credited with enabling this government project to be completed on time, despite a serious shortage of workmen. G. W. Williams Co., general contractor, Burlingame, Calif., held the contract for installing ½-in. Sheetrock gypsum board used on walls and ceilings in 78 buildings erected on a 130-acre site.

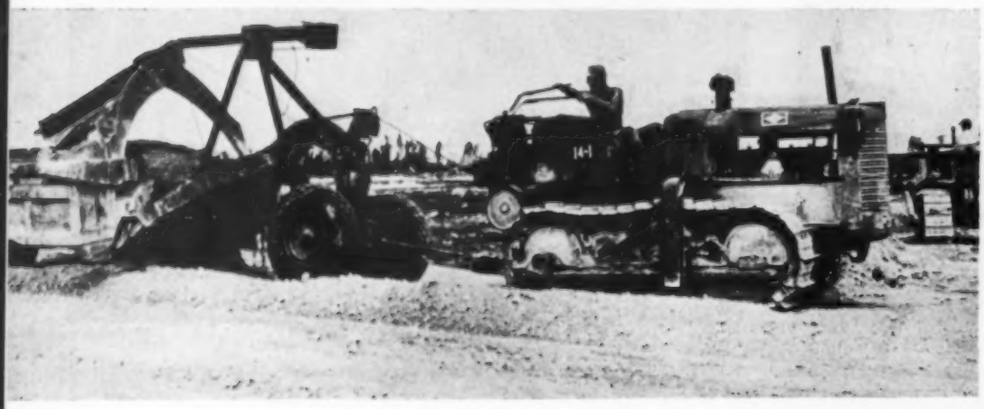
The tools, illustrated herewith, were a combination mastic and tape applicator and a topping tool. These were described by Mr. Williams as having "saved the day" when a labor shortage threatened completion of the work on schedule. Introduction of the tools enabled unskilled workmen, said Mr. Williams, to turn out two to four times the amount of work that skilled workers would have performed in filling and taping wallboard joints by hand.

In addition to speeding the operation, the new tools proved to be additional time-savers by eliminating the need for scaffolding on overhead work. Inventor of the tools is Robert Ames, a Burlingame paint distributor, who said that in addition to the time-saving feature they offer, the tools give a uniformity of tape application and a strength of joints not obtainable by hand.

While Mr. Ames had been using less efficient models over a period of 5 yr., it was not until the Dibble General Hospitable job was under way and the contractor found operations hampered by a shortage of workmen that the tools were developed to a state in which they could be used advantageously by inexperienced operators. The tools can be employed on any of the gypsum wallboard used for first class dry-wall construction where taped joints are used between panels. It was found that this type of joining can be made so perfect that it is impossible to detect the joints after the room has been painted or papered.

SEA FORT manned by British Royal Marines and Naval personnel guards shipping lanes and protects convoys against mines and mine-laying planes. Built on shore, these forts are towed out and sunk on sandbank in English Channel and off East Coast. Living accommodations are inside concrete towers.
British Combine Photo

PRECISION BOMBING by U. S. forces during Normandy invasion operations is responsible for bent rails and shattered foundations of bridge over Loire River at Tours. Systematic destruction of these communication links impeded reinforcement of German forces.
Press Association Photo



CORAL for captured Peleliu airstrip is laid by U. S. Navy construction worker who operates controls of carry-all scraper from his Allis-Chalmers tractor. Armed Marine paces behind vehicle to guard against snipers.
British Combine Photo

ALUMINUM PLANK, weighing only 35 lb., half as heavy as pierced steel plank formerly used, is placed to surface airfield strip. Sheet is made of Alcoa 61 S-T alloy, 0.188 in. thick, with yield strength of 35,000 lb. per sq. in. Thickness is approximately 40 per cent more than that of steel sheet to obtain same rigidity with reduced weight.
Alcoa Photo

JAP PILLBOXES on islands in Pacific area (below) are routed out by U. S. Marines using International diesel tractor equipped with Bucyrus-Erie bulldozer.
Marine Corps Photo

SPECIALLY DESIGNED for blitz work. 10-ton American-made Lorain moto-crane aids rescue work on London building hit by flying bomb.

British Combine Photo

THIS MONTH'S NEWS REEL

WORLD'S DEEPEST OIL WELL (right) is drilled near Taft, Calif., by crews of Standard Oil of California seeking additional sources of crude petroleum for war needs. So far it reaches more than 15,300 ft. into earth. More than 548 bits attached to drill rods have been used.

Wide World Photo

AMERICAN POWER SHOVEL (below) rolls past sign marking border of Germany, as Allies pour into Aachen. At right is power line standard.

Acme Photo

ROAD DRAINS (below) are dug by British Army Pioneer Corps as transport columns push beyond Seine in France. British Information Services Photo

War-Made Invasion Ports

Formed by Prefabricated Concrete Caissons and Floating Breakwaters Towed Across English Channel to Normandy Beachheads

ARTIFICIAL HARBOR along Normandy beach is created by British forces using both scuttled block ships and prefabricated concrete caissons of cellular type, at right, towed to place and sunk to form outer breakwater. Into sheltered water floating piers or ponton bridges extend from shore to spud pierheads where ships unload cargoes for use of invasion forces.

British Official Photo

LONG FLOATING PIER between shore and spud pierhead carries roadway over which trucks deliver supplies unloaded from Allied cargo vessels. Tidal range at port site is 20 ft.

British Official Photo

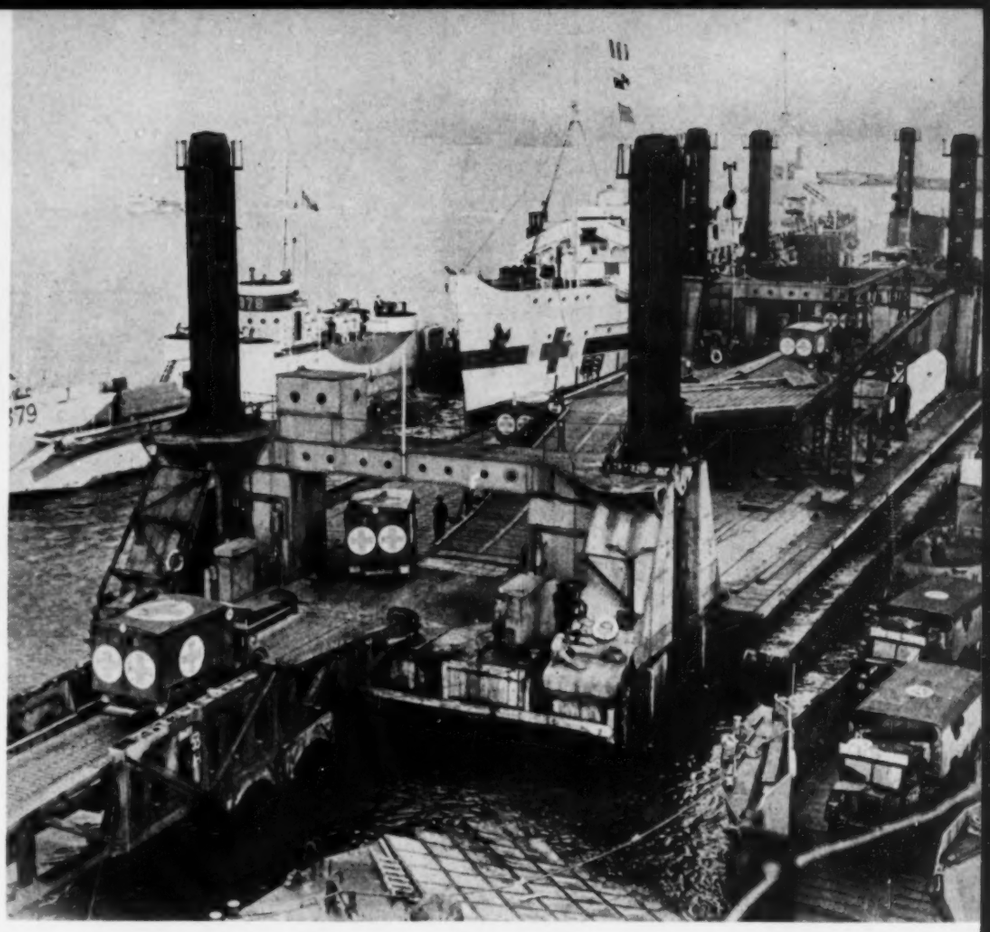
Here is the extraordinary and dramatic story, released by Supreme Headquarters, Allied Expeditionary Force and made available by British Information Services, of how two artificial harbors were created on the coast of France, in the face of enemy opposition, to serve the allied forces which landed on D-Day, June 6, 1944. Structural elements needed to provide breakwaters, floating piers and other accessories for the harbors, involving 330,000 cu. yd. of concrete and 31,000 tons of steel, were built in Britain by a labor force of 20,000 men and towed across the Channel to points of anchorage or (in the case of the concrete caissons) sinking. The largest of a total of 146 caissons had a displacement of 6,044 tons. Each harbor is described as "about the size of Dover", which covers 760 acres. The tidal range at the port sites is 20 ft.—EDITOR

DURING THE ADMINISTRATIVE PLANNING of the invasion (for which D-day was June 6, 1944) it became clear that even in the best possible case of all French ports falling into our hands undamaged at an early stage of the operation, the quantity of the stores to be landed for the maintenance of the force would exceed port capacity. This meant that stores would have to be landed over the beaches while the ports were being improved. It was generally estimated that the quantity to be landed in this manner amounted to about 12,000 tons and 2,500 vehicles of all shapes and sizes per day, and that this would not be reduced for at least 90 days, during which many interruptions by bad weather might be expected.

In June, 1943, the Chief of Combined Operations held a meeting in London of the commanders of both the British and U.S. forces, with representatives of the British Service Ministries, to hear reports of the equipment that was being provided for the operation, and to consider what additional equipment could be provided in the time available. Among other things, the meeting decided that artificial harbors were essential to provide sheltered water for unloading over the beaches to meet the administrative demand.

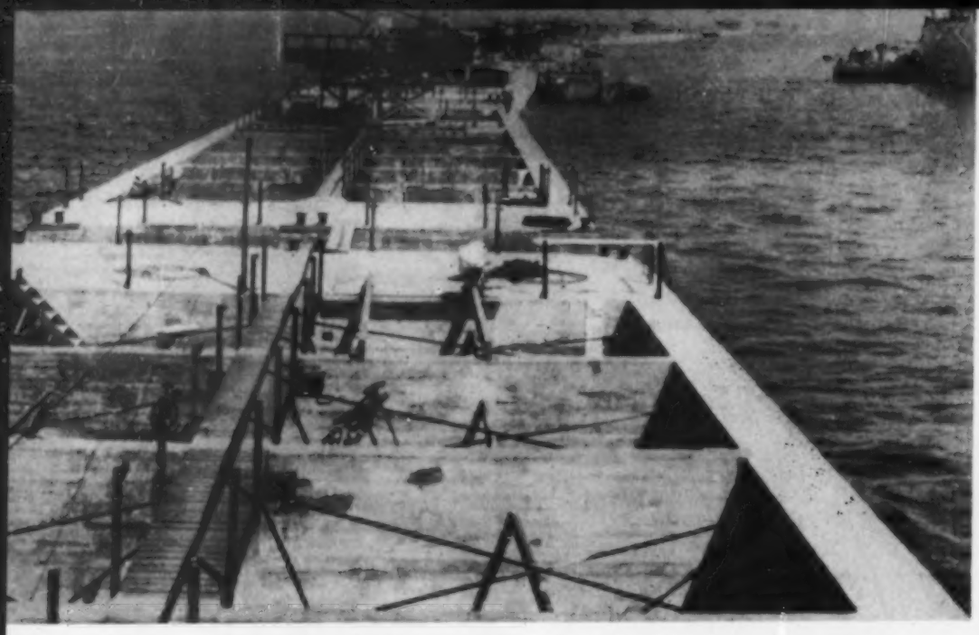
This decision was submitted, as part of the operational plan, to the Combined Chiefs of Staff at the Quebec Conference.

On receipt of their approval, technical



PIERHEAD at offshore end of floating bridge, where vessels unload, is held in place by spuds like those commonly used on dredges. End of floating pier appears in lower, left corner. British Official Photo

ROADWAY CARRIED ON FLOATS, for truck transport of ships' cargoes, extends shoreward from spud pierhead. British Combine Photo



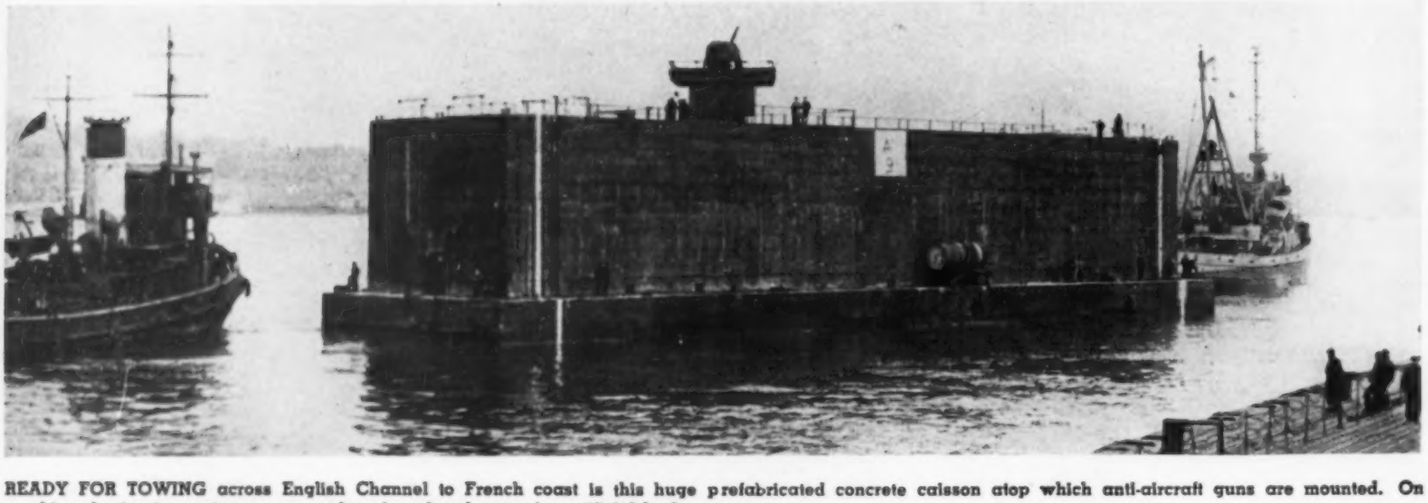
PREFRABICATED CONCRETE CAISSONS of cellular type, built in Britain and towed across Channel, are sunk to form harbor breakwater. Largest caissons had displacement of 6,044 tons.

Press Assoc. Photo

experts from the Admiralty and the War Office were telegraphed for and flew over to join their U.S. counterparts in order to make full use of the resources of both countries. By Sept. 3, 1943, they had reached their conclusions and their recommendations had been submitted to the Combined Chiefs of Staff in Washington.

It was fully realized that the time was so short that the undertaking would be risky, as it was very unlikely that the necessary equipment could be produced in time to permit exhaustive tests or to make modifications in the light of later experience. It was, however, decided that the risks had to be accepted, that experiment and construction should proceed concurrently, and that all the work should be done in the United Kingdom in order to save time, although the labor and materials situation was more difficult than in the United States.

The plan originally accepted was that two artificial ports, one in each sector,

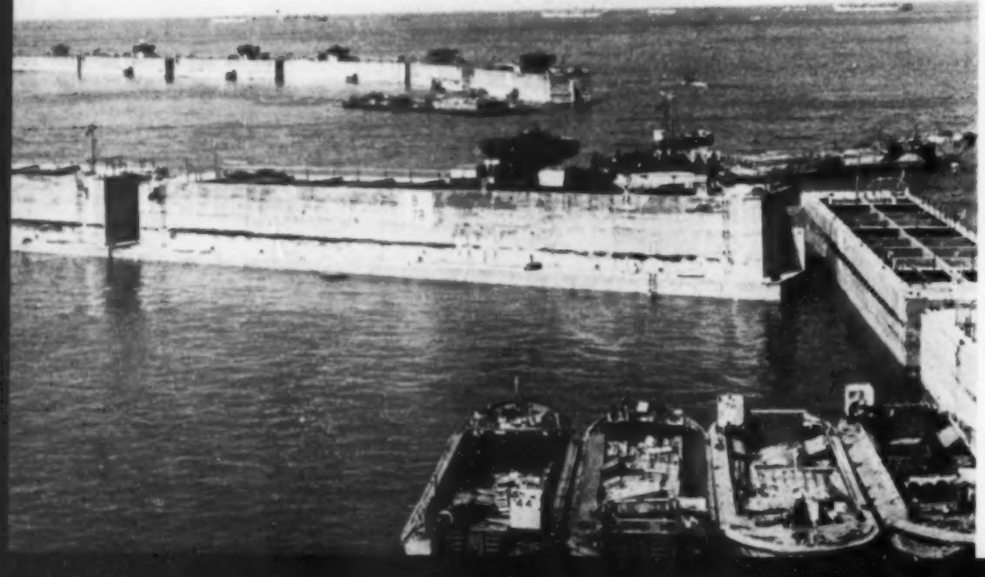


READY FOR TOWING across English Channel to French coast is this huge prefabricated concrete caisson atop which anti-aircraft guns are mounted. On reaching destination, caissons are sunk to form breakwater for artificial harbor.

British Official Photo

SUNK IN LINE to form breakwater for harbor protection are these cellular concrete caissons (below), built in Britain and towed across Channel to coast of France.

Acme Photo



the British and the U.S., should be made, each consisting of a breakwater formed by concrete caissons. The War Office, which had already been considering the project, undertook to produce the caisson designs. In spite of the great quantity of work to be done and such essential experiments as the effect of wave action on the design—which were carried out at the National Physical Laboratory—sufficient working drawings were produced by Oct. 4, and the final drawings were substantially completed by Oct. 20, all details being finished by Nov. 27. The execution of the work was placed in the hands of the Ministry of Supply on Sept. 24, 1943.

In order to accommodate the necessary shipping and port equipment, the size of each harbor had to be roughly the same size as Dover, which entailed the construction of 150 caissons. For technical reasons, these could not be placed in water deeper than 5½ fathoms (33 ft.), which meant that only a limited number

LOOKING OUT FROM BEACHHEAD are seen group of vessels in artificial harbor following violent storm which damaged floating pier.

Press Assoc. Photo

of ships, such as the Liberty type, could use the harbor. It was therefore decided to make an outer floating breakwater in addition, and this task—including experiment, design and production—was undertaken by the Admiralty.

In January, 1944, it was realized that the number of tugs likely to be available was less than the demand. This meant slowing down the rate of construction of the harbors and increasing the risk of interference by bad weather. In order to provide immediate shelter for the host of small craft it was then decided to make five short breakwaters, formed of blockships, along the invasion coast. These could be provided quickly and would give immediate shelter. Two of them would be incorporated in the artificial ports. Sixty ships of varying sizes and types were earmarked by the Ministry of War Transport for this purpose, including some warships such as H.M.S. *Centurion*, the French battleship *Courbet* and the Netherlands cruiser *Sumatra*, giving a total length of about 24,000 ft. of breakwater.

In the final layout of the breakwaters there were, therefore, three elements: Concrete caissons, breakwaters and blockships, all of which had to be got ready in a very limited time.

The Admiralty was made entirely responsible for the floating breakwaters and the blockships, and, in addition, for the conformity of the caisson design with naval requirements, as regards towing, seaworthiness, etc., for the final location of the equipment in assembly parks in the United Kingdom, for the towing of equipment across the Channel and for the general layout of the artificial harbors.

The War Office was responsible for the design and the provision of the concrete caissons and piers, for their movement

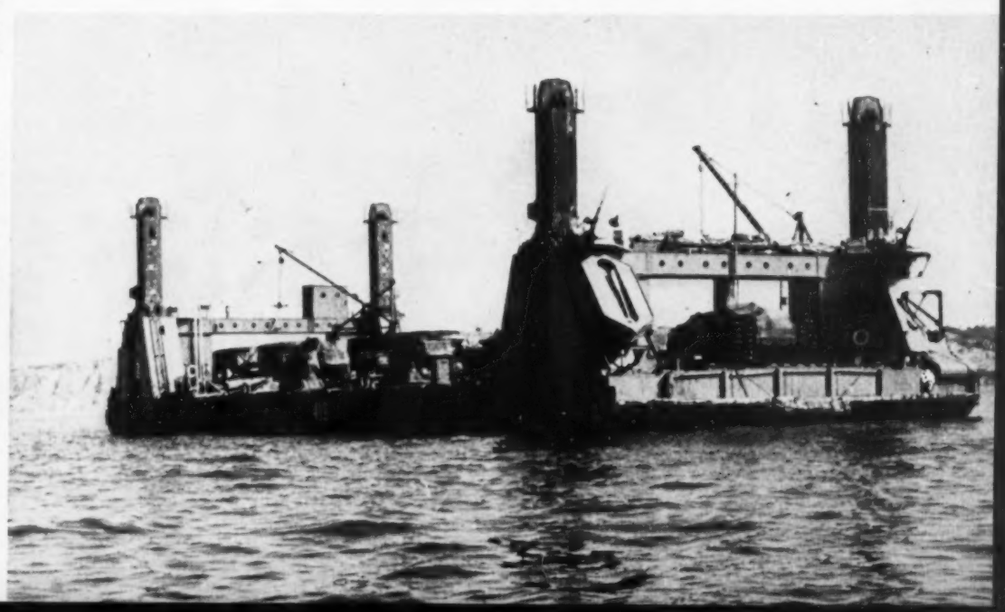
(Continued on page 128)

FLOATING BREAKWATER of steel units joined end to end is moored to form long line and produce damping effect on sea along outer harbor line.

British Combine Photo

FLOATING PIERHEAD (below) after cross-channel tow is ready to be anchored by spuds at four corners to form cargo-unloading terminus of float-supported bridge extending out into harbor from Normandy shore. Each pierhead contains crews' quarters and storage accommodations.

Acme Photo



SMALL-TOOL *Shortcuts*

Aid Ship Construction

"GIVE AN AMERICAN a monkey wrench, a hammer and a lathe and he'll build you anything, if his heart is in his job."

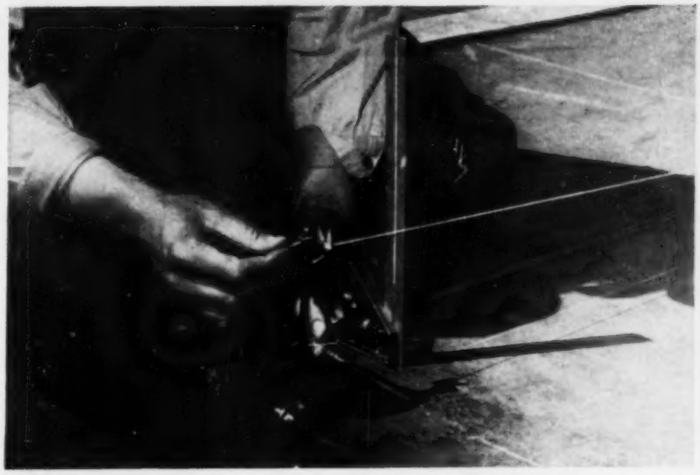
Such is the unqualified assertion of officials of the four Kaiser-operated shipyards in Richmond, Calif., where vessels for the U. S. Maritime Commission, for a period of an entire year, went sliding down the ways at the rate of nearly 30 ships a month. Here the construction man's ingenuity has solved many a difficult problem, especially through the development of small tools for special jobs. The yard workmen, in close cooperation with the Labor-Management Committee, are credited with having contrived an almost endless list of small-tool shortcuts to production that won for Richmond Yards Nos. 1 and 2 the national record for the construction of Liberty ships.

A few of the ingenious small-tool applications at the yards are illustrated in the accompanying photographs.

NEW METHOD FOR TEMPLATE manufacture is contributed by Art Mori, mold loft superintendent. Battens are now nailed securely to mold loft floor. Template material is temporarily tacked on top of batten along which an electric Speedmatic saw is run, thereby cutting template exactly to batten curvature.

REAMER GRINDER is devised by Dave Schmidt and Ed Mascone, machinists. In their machine, carriage is maintained at fixed angle with relation to wheel, thus reproducing identical angle in all reamers operated upon. Due to ease with which machine can be handled and adjusted, operation may now be assigned to woman worker, instead of experienced machinist, thus releasing him for operations requiring skilled worker.

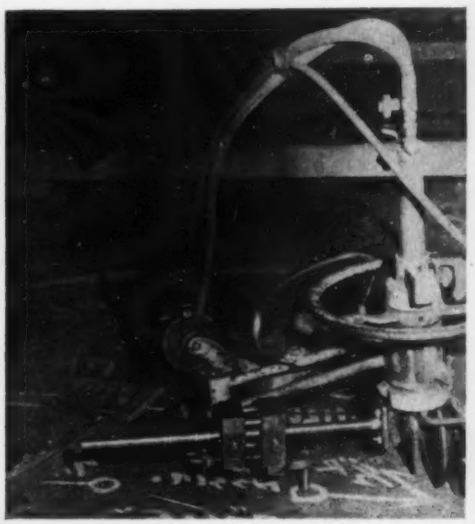
DRILL PRESS FIXTURE is devised by F. Richardson, machinist. Short sections of tubing are welded to engine room railing to form thimbles for reception of upper ends of stanchions forming supports for railing. Drill press fixture was evolved which holds two nipples in opposition, provided with flying quarters being rotated by drill press spindle between thimbles. This device may be operated by machinist trainee, thus releasing more experienced man for other duties.



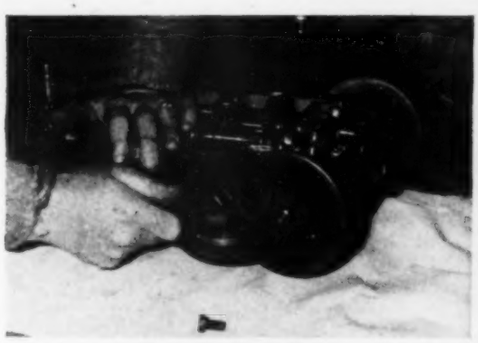
SCRIBING OF LINES at right angles to edge of wavy plate is simplified by Shipfitter Pete Repak's improved procedure, calling for elevated block which is vertically slideable along rod rising from edge of plate. Block is then depressed to bring line into contact with plate surface. Worker then depresses with his thumb both sections of line lying on either side of his thumb.

SCREW HOLDER is designed by J. Candray, of prefabrication plant. This special tool comprises lever having bit which engages screw head slot, and is provided with hook member extending through air port opening. Arm acts as fulcrum for lever, so that bit may be securely held against dislodgment in screw head slot. Speeds screw mounting and eliminates damage.

CHECKING GAGE for line shaft flanges is invention of Al Meuniet, machinist. Regardless of whether flanges are of equal diameter, indicator device will insure they are in perfect register concentrically. This is accomplished by removing device along periphery of one flange and shifting other flange until middle of dial indicator shows same reading at all proofs along path of movement.

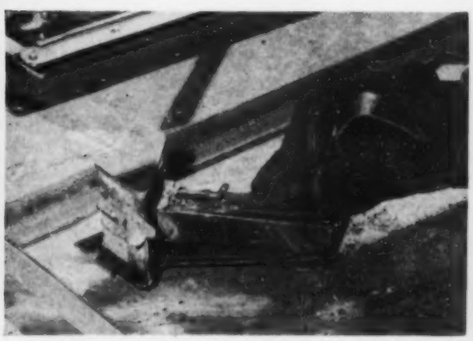


MICRO-METRIC RADIUS ADJUSTMENT is developed by Claude James, of plate shop. New block which holds center pin comprises section which may be clamped to radius rod on CM16 burning machine. Feed screw connects fixed and movable section so that latter may be very finely adjusted, even while machine is in operation, thus producing accurately cut holes.



DRIVE WHEELS of Union Melt tractors were formerly made in one piece and permanently attached to ends of drive axles. J. Pancoast, Union Melt man, developed new type of wheel with demountable rim, which is attached by few screws on hub permanently mounted on axle. Replacement of wheels may now be accomplished in few minutes, involving no more effort than removing screws and replacing worn rim with new one.

DRILLING OVERHEAD HOLES in cabin ceiling plating resulted in lost time as well as drill breakage. But Charles Porter, of sheet metal shop, mounted drill in end of vertically reciprocal rod, operated by foot pedal. Driller may now rapidly drill holes without having to bear weight of the drill. Fatigue is thus eliminated and drill breakage has become rare occurrence, with resultant savings in time and maintenance costs.



CORNER BRACE HOLDER is credited to Jim Woo Wong, welder in sheet metal shop. It has greatly facilitated welding operation aboard ship hulls. In certain sheet metal construction aboard vessels it is necessary to weld triangular corner pieces at intersection of adjacent wall members. New type of holder dispenses corner pieces as required, pushes them into corner, and holds them in place for tackwelding.

High-Capacity Fontana Plant

Produces Large Daily Output for 2,800,000-Yd. Concrete Dam

By R. T. COLBURN, Construction Plant Engineer,

Tennessee Valley Authority, Knoxville, Tenn.

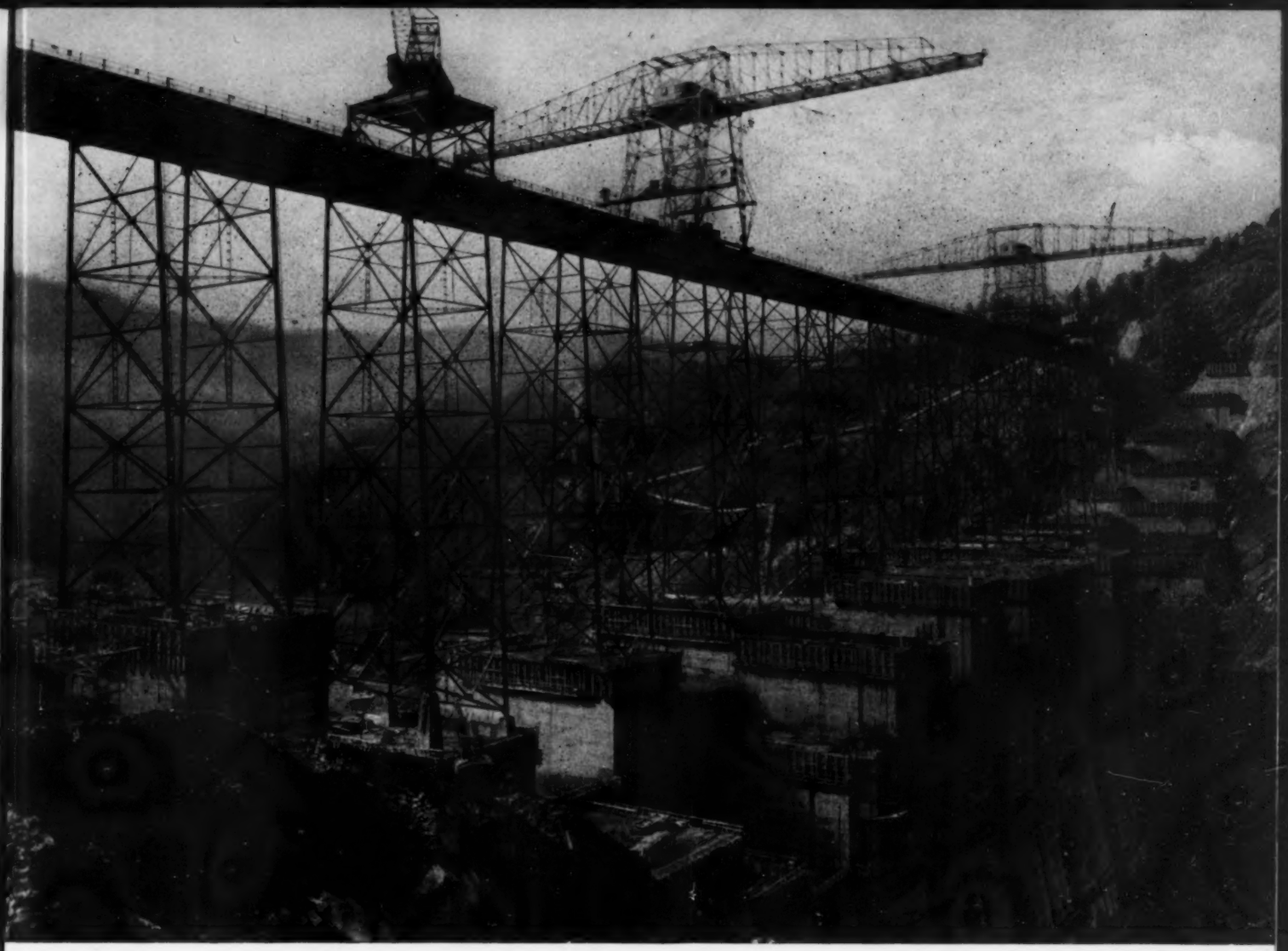
FONTANA DAM and other projects of Tennessee Valley Authority are built under direction of A. L. PAULS, chief construction engineer.

IN TWO PARTS . . . Part 2

Layout and design of the construction plant for Fontana Dam were illustrated and described in Part 1 of this article, published last month, "Construction Methods," November 1944, page 54. Readers are referred to Part 1 for drawings of the plant layout and of the flowsheet for processing aggregate, made from quartzite rock. Part 2, printed here, describes the plant and methods employed in producing and placing concrete at a rate of 200,000 cu. yd. per month.

CONCRETE FOR FONTANA DAM is mixed in five 4-cu. yd. front-charge tilting mixers arranged in a circle to discharge into a central wet-batch hopper. The mixer plant is located in an octagonal structure containing eight bins for aggregate and sand and two center compartments for cement with a total capacity of 1,200 tons of aggregate and 1,500 bbl. of cement. Plant operation is entirely automatic, and batching and mixing

EXTENSIVE LIGHTING SYSTEM (below) at Fontana permits construction of 2,800,000-cu.yd. concrete dam to proceed at normal 400-cu.yd.-per-hour pace by night as well as by day. Structure rising 460 ft. above river bed and measuring 2,300 ft. along the crest is concreted in twenty months from time first bucket is discharged.



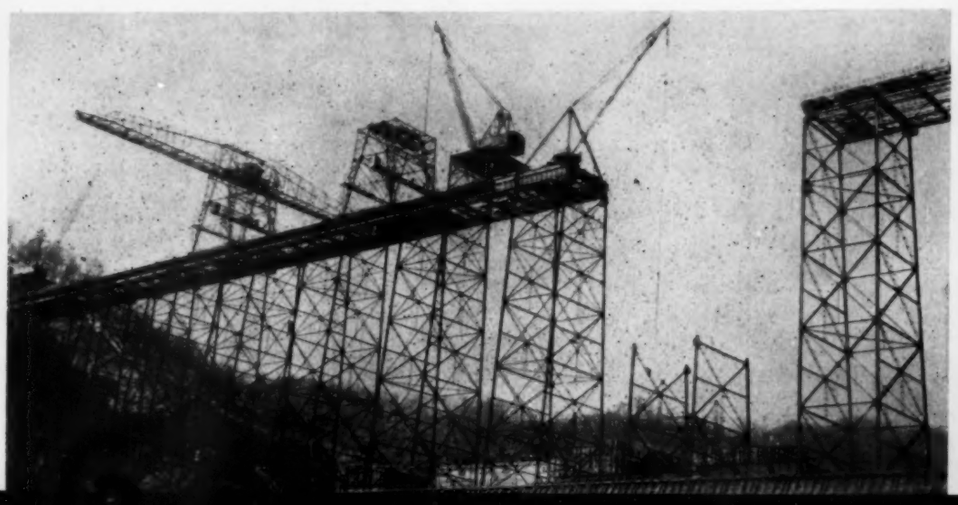
ON CONSTRUCTION TRESTLE 200 ft. above concrete previously placed from low-level trestle, two hammerhead cranes and two revolving cranes handle 4-yd. buckets of concrete from transfer trains into blocks of dam. Hammerhead cranes have total span of 300 ft. from tip to tip.

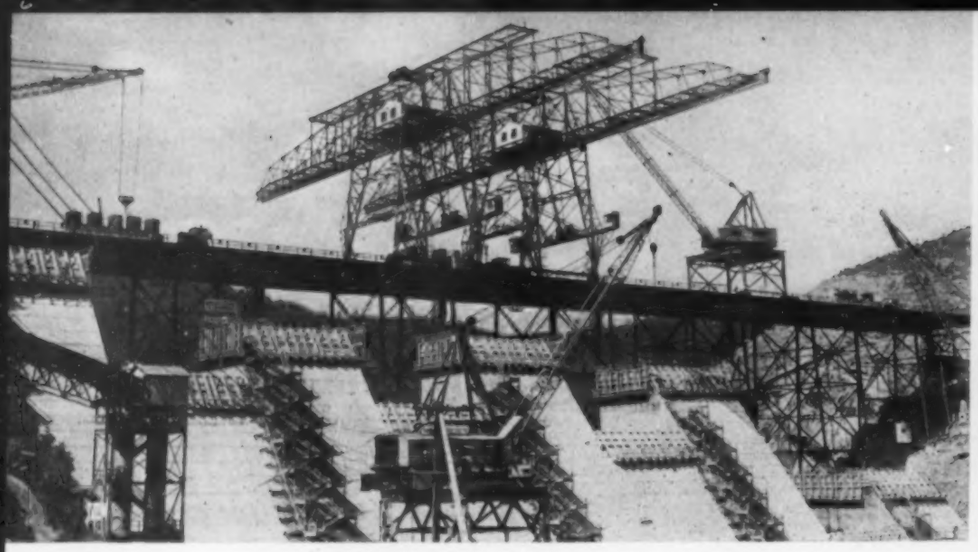
are controlled by one man. Batching equipment consists of six aggregate and sand batchers, two cement batchers and a water batcher. The batchers are filled by gravity from the bins above them. Concrete from the wet batch hopper passes through a radial gate on to a conveyor belt which conveys the mixture to a concrete hopper on one of the construction bridges.

Prior to June 1, 1944, the best concrete placing record occurred during May,

HIGH-LEVEL TRESTLE (right) 430 ft. above riverbed incorporates deck steel being dismantled from low-level trestle at top of concrete. Revolving crane on trestle in right foreground places concrete in power house and toe of dam. Belt conveyor from mixing plant delivers concrete to hoppers at end of trestle.

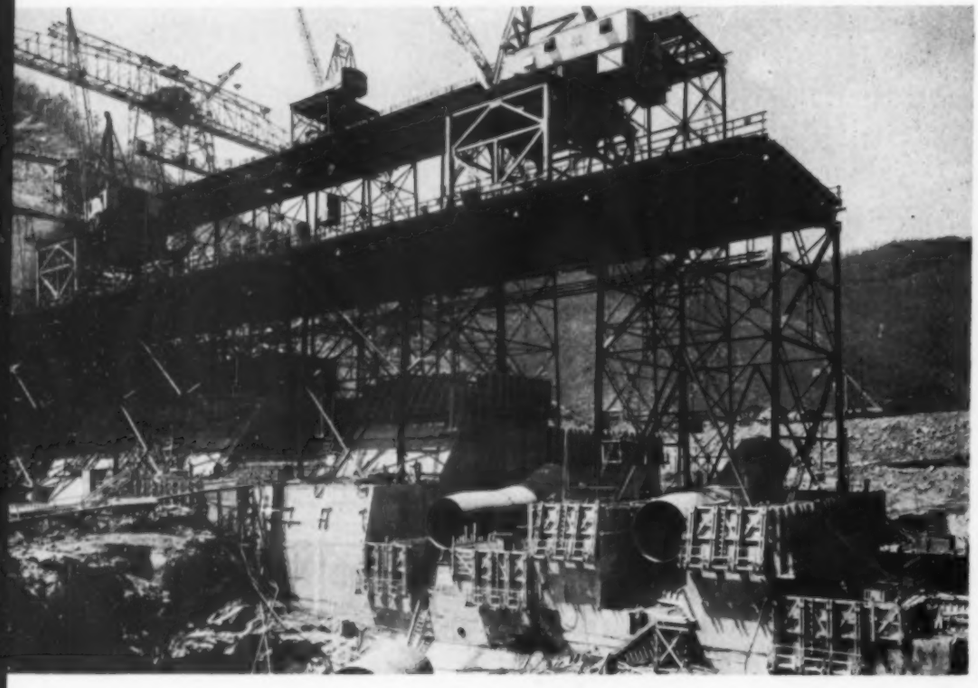
STIFF-LEG DECK TRAVELER on skids sets last 200-ft. steel tower for high-level trestle while revolving crane assembles second hammerhead unit.





LOW-LEVEL TRESTLE rising 230 ft. above river bottom carries two hammerhead and two revolving cranes which place concrete up to this elevation. Entire changeover to trestle 200 ft. higher then is completed in two months, during which concreting is stopped for only five weeks.

AIR-OPERATED CONCRETE BUCKET discharges 4-yd. load when air nozzle is inserted into socket. Workman has just removed nozzle after tripping dumping mechanism. Opening, discharging and reclosing bucket require total of only 2 sec.



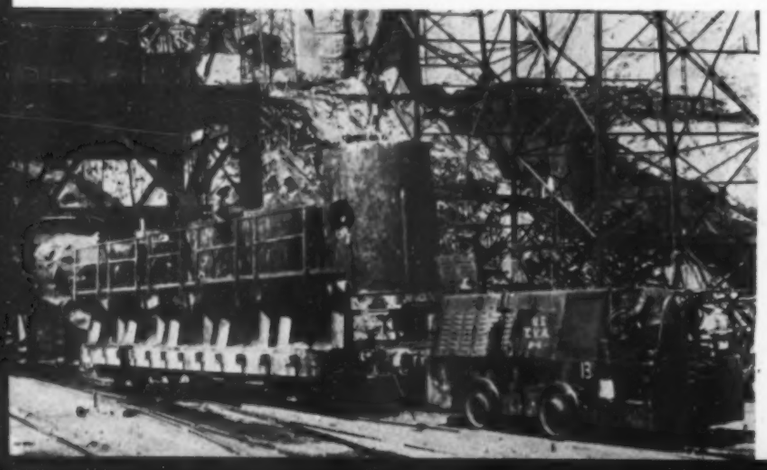
DURING EARLY STAGE of dam construction revolving cranes on power house trestle handle concrete and penstock sections into this part of structure. In background, revolving cranes on erected portion of low-level dam trestle are completing assembly of first hammerhead unit.

1944, when 243,760 cu. yd. of concrete was placed. The best week was May 22 to May 27, 1944, inclusive, when the following daily records were made: 8,720, 10,001, 10,004, 10,001, 9,666 and 9,548 cu. yd., making a six-day total of 57,940 cu. yd. The best 8-hr. shift produced 3,800 cu. yd.

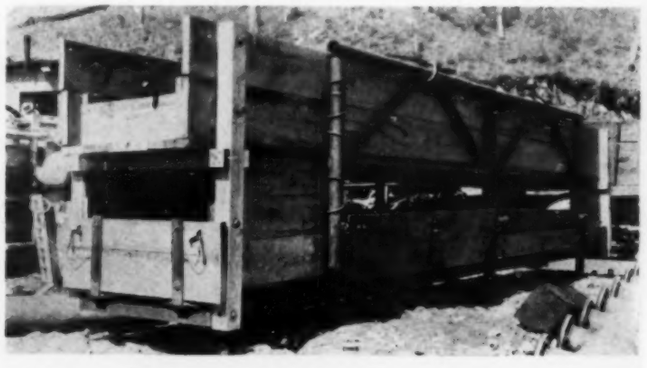
Concrete Placing—Plans for placing 2,800,000 cu. yd. of concrete in 20 months called for three construction trestles. One trestle is at the power-house level for use in placing concrete and equipment in the power-house area and in the toe of the dam. The power-house was designed as a concrete structure in order to save steel, and the concreting requires much special formwork and many small pours. The second trestle, located almost in the center of the dam about 230 ft. above the bed of the river, was used to place concrete in the main dam up to this level. The third trestle is directly over the location of the second and is about 200 ft. higher.

When the third trestle was erected, the deck of the second low-level trestle was removed and used again on the high level. Scheduling of the changeover from low-level to high-level trestle required

CONCRETE TRANSFER TRAIN made up of diesel locomotive and flatcar with pockets for one empty and four loaded buckets shuttles between concrete hoppers and cranes on construction trestle.



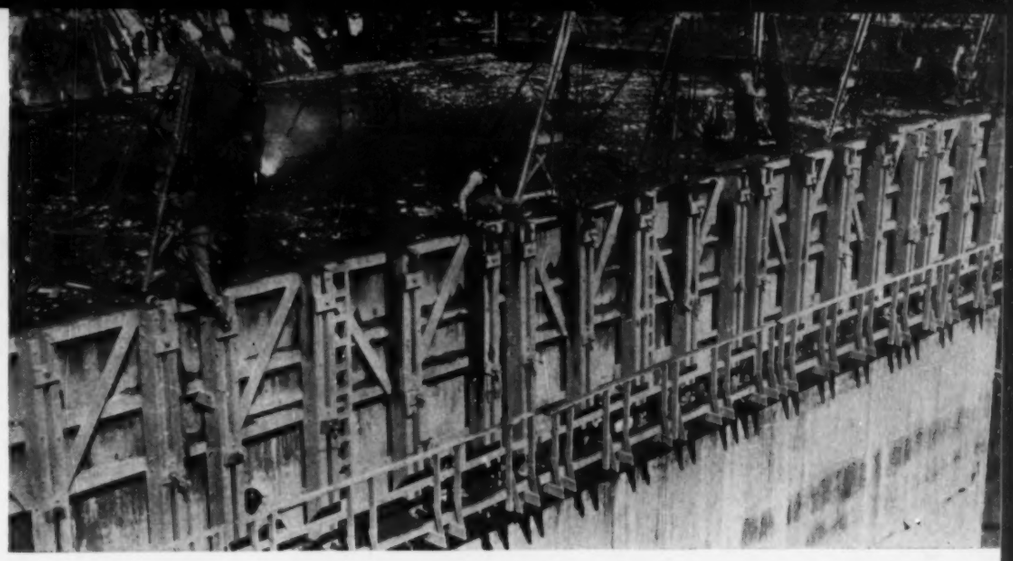
SPECIAL MATERIAL BOX is filled in advance with all pipe, fittings and other items needed in a concrete block, thus saving time of workmen who prepare block for next lift of concrete.



coordination of several different operations and involved the dismantling and erection of two hammerhead cranes, two revolving cranes, concrete hoppers, concrete belt conveyor and about 3,500 tons of trestle steel. The entire changeover was completed by the job forces in two months, and total shutdown of concreting was necessary for only five weeks.

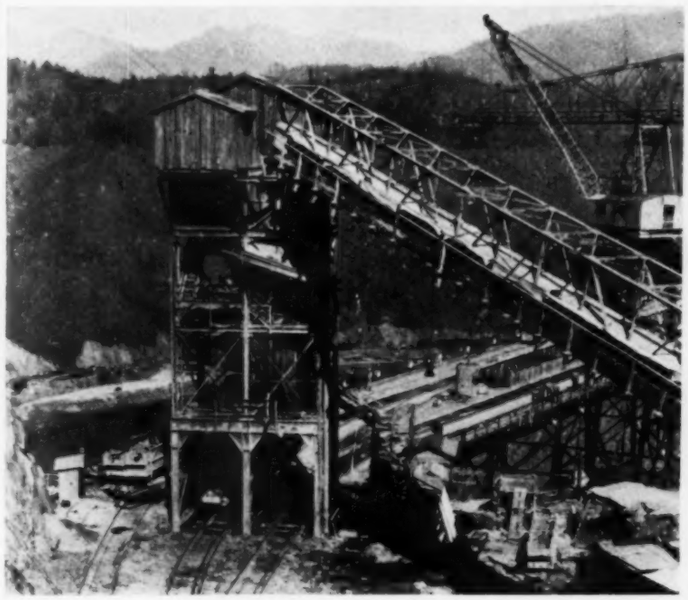
Belt conveyors transport concrete from the mixer plant to all three trestle locations and discharge into concrete hoppers at the ends of the trestles. On the main trestles, four cylindrical concrete hoppers, 5 ft. in diameter and 25 ft. high, are set over two tracks for loading two trains at a time. Concrete is distributed to the

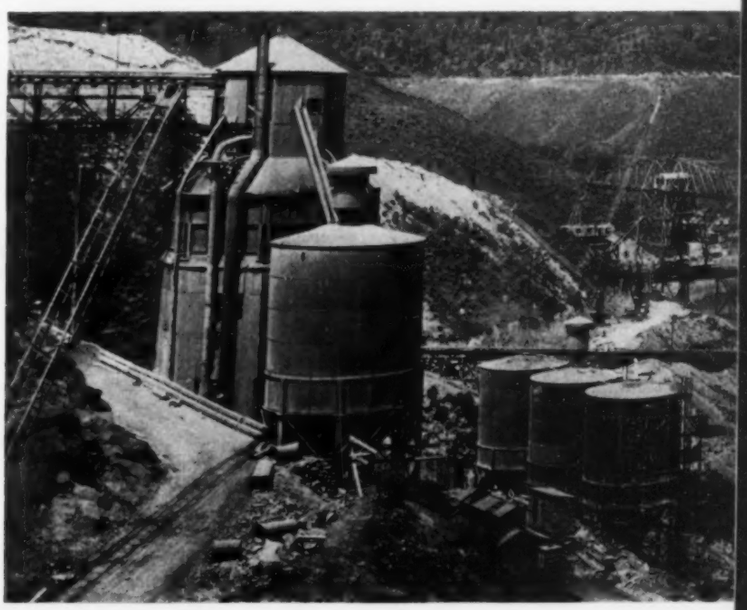
(Continued on page 142)



FOUR CYLINDRICAL HOPPERS (below), 5 ft. in diameter by 25 ft. high, are set over two tracks at end of trestle for loading two trains simultaneously. Hoppers receive concrete by belt conveyor from mixing plant and discharge it into 4-yd. buckets on flatcars.

CANTILEVER FORMS are raised by A-frames with hand winches for fastening by 1-in. bolts screwed into ty-loops embedded in concrete. Vertical cantilever beams on 4-ft. centers are double 4x12-in. timbers.

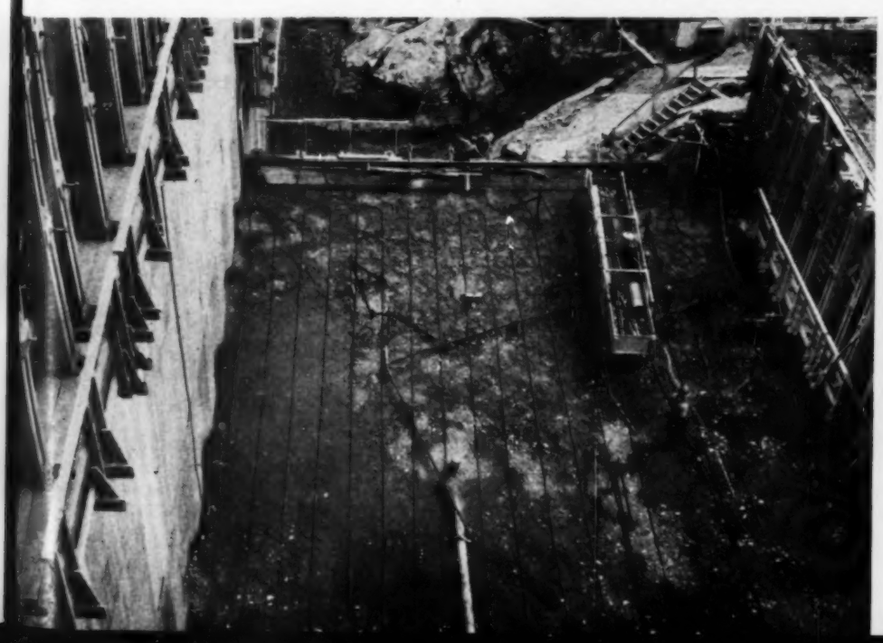




PIPE COILS (below) for cooling water are placed on concrete block in preparation for next 5-ft. lift. Note special box containing all materials needed by workmen in making block ready for concrete placement.

CONCRETE MIXING PLANT (above, right) equipped with five 4-cu.yd. front-charge tilting mixers has aggregate bins holding 1,200 tons and cement compartments of 1,500-bbl. capacity. Adjacent to plant are four 6,000-bbl. steel storage silos to which cement is delivered by air-activated conveying system through 6-in. pipe line 3,000 ft. long.

FOR CONCRETE COOLING, double sets of risers and return pipes for river water and refrigerated water (below) are erected on faces of dam with manifolds at 5-ft. levels for hose connections to cooling coils.



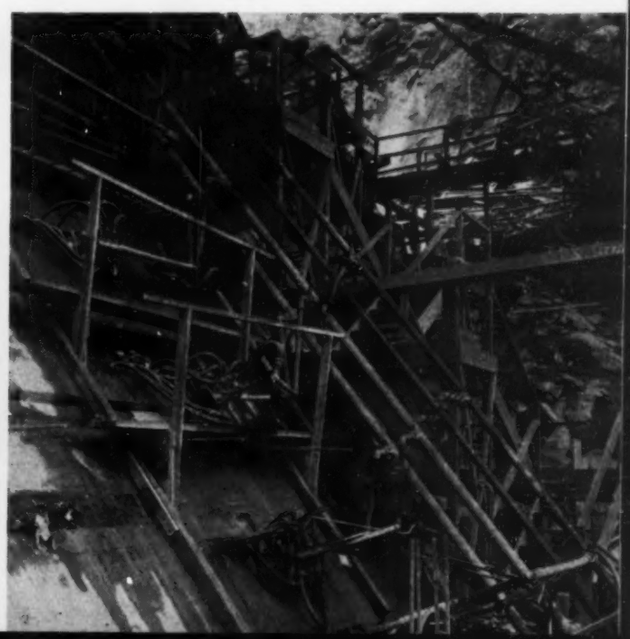


Fig. 1 . . . RIPPING TABLE for form lumber has air-powered saw mounted underneath with circular blade protruding.

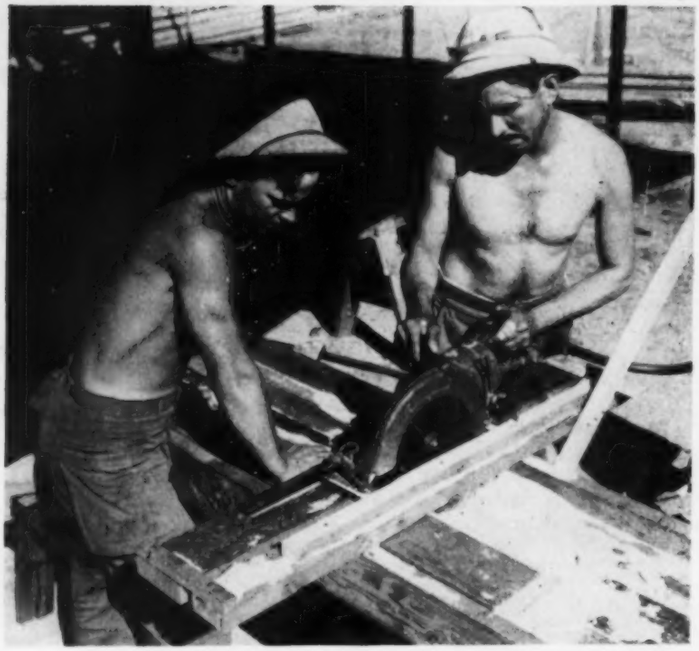


Fig. 3 . . . KICKER BLOCKS are cut by Skilsaw operating in guides with stop-block at end.

Pneumatic Tools

Aid Building of Wood Forms for Air Base Paving in India

By LEO J. COLCLOUGH, Lieutenant, Corps of Engineers, Engineer Aviation Battalion

Fig. 2 . . . CHAMFER KEYS of 2-in. native timber are cut at 45-deg. angle.

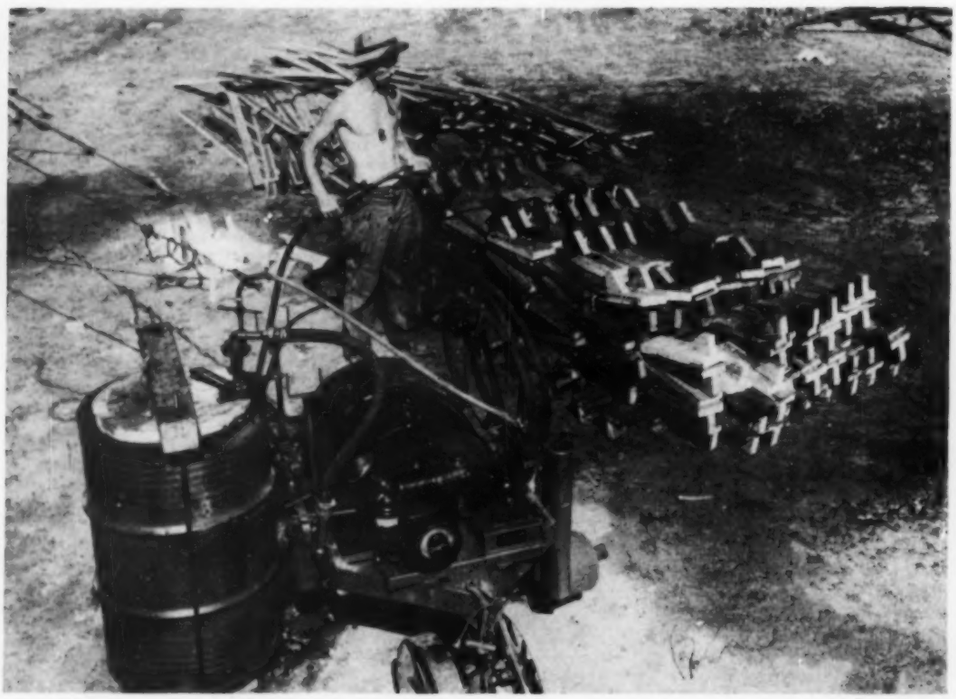


Fig. 4 . . . CRANKCASE OIL is sprayed on kicker blocks, using camouflage paint spray.

AT A SMALL RAILROAD SIDING somewhere in eastern India, the Engineer Aviation Battalion debarked from a troop train; their assignment was the building of an airfield for the new super-fortresses, the B-29. Engineer equipment arrived slowly and the job began to get under way. When it came time for the concrete mixers to arrive, it was then known that the pavers for the job would not be available, nor would the metal forms. Expedients had to be resorted to; stationary mixers were available and wood could be obtained to make forms.

The problem of making wood forms in large quantities had to be solved. A thorough search for equipment was made. The only equipment available were pneumatic saws and wood-boring tools that accompanied the motorized air compressor. The only lumber available was native timber, sawed by hand and having no straight edges, together with a small amount of U. S. lumber that could be salvaged from crates and boxes. The native lumber varied greatly in width and length. This made the problem more difficult, for all timber had to be ripped, once to straighten one side, then once more to get the correct width.

Many questions arose as to how to get production. Would the hand pneumatic circular saws work satisfactorily? Could the timber be ripped straight? Could chamfered keys be ripped for the form? Saw mantlers and circular saws would have done the trick, but were not available.

These many questions were soon answered and materials were obtained to set up a production line to make forms at a high rate of speed. To do the ripping, a table 7 ft. long and 4 ft. wide was built, the height being approximately 3 ft. 6 in. to insure easy handling of timber. The pneumatic saw was mounted underneath the table so that the blade protruded above the table, the position of the saw under the table being 2½ ft. from the working end and 2½ ft. from the left side. To mount the saw on the table, a hole had to be cut for the slide plate. The hole was cut ½ in. smaller than the slide plate in order to support the saw. The slide plate was countersunk enough to permit two flat plates of ⅛-in. steel to be placed on each side of the saw, flush with the top of the table and held in place with screws. These plates held the saw firmly in position at all times. A movable guide or gage made of 2x2-in. lumber was placed on the left side of the saw to gage the width of timber being ripped. The steel plates held the saw guard down out of the way. Fig. 1 shows ripping operation.

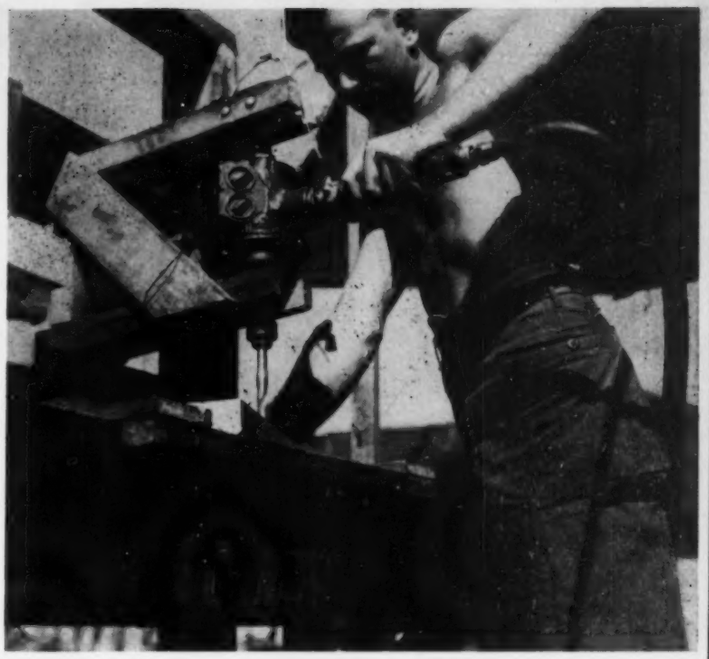


Fig. 5 . . . HOLES ARE BORED in blocks by air-powered drill mounted in improvised wood frame.

The material for this rig consisted of 2x4's and 2x6's for the table, two pieces of metal plate ⅛x4x18 in., and one pneumatic saw. Approximate time to construct the rig was one day, using one carpenter.

The native timber has no straight edges. A chalk line was used to mark one side of the timber straight. The timber was placed on the table, after being marked, and sawed along the chalked line. After one side was sawed straight, the timber was returned through the saw and ripped to the correct width by the use of the gage. Four men were required to operate the

(Continued on page 148)

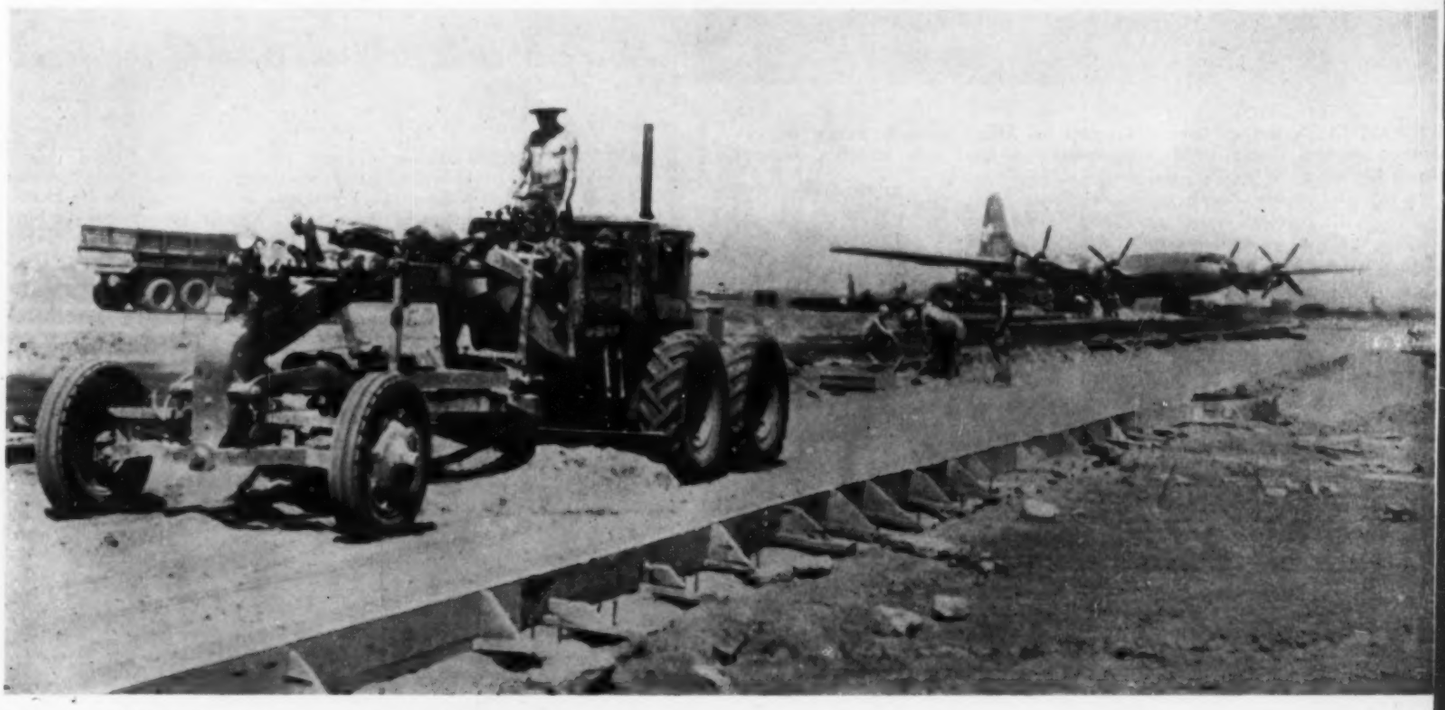


Fig. 6 . . . JOB-MADE FORMS of wood are set for concrete paving of airport runway.

HEDGEROW PLOW is used by Allied Forces in Normandy to pierce thick embankments which had resisted tanks long enough to make them easy targets. It consists of four prongs made of angle steel salvaged from Nazi beach barriers and affixed to light or medium tank.

Signal Corps Photo

TURNTABLE of railroad yard in French city is moved by bulldozer (left), as electric power was cut off when Americans entered town.

Signal Corps Photo

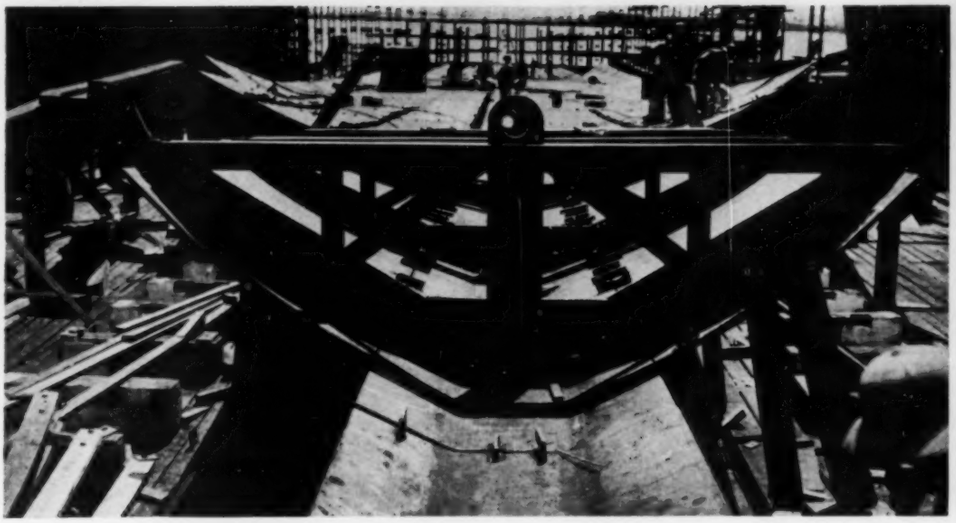
EP RAILWAY keeps up flow of supplies for Allied forces in Burma through onsoon season. Jeeps fitted with removable front axle carrying flanged heels operate on rails.

British Combine Photo

HOW They Did It

CONSTRUCTION DETAILS For Superintendents and Foremen

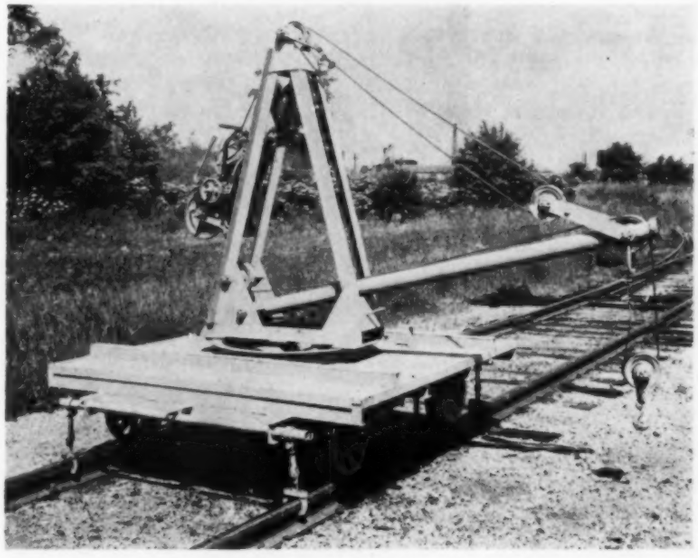
TANDEM TRAILERS (below), Rogers gooseneck and flatbed units, transport 16-in. coast defense rifle weighing 145 tons behind Mack truck of C. E. Hall & Sons Co., Somerville, Mass., contractor for hauling and placing number of these guns. Cradle on forward trailer, reinforced with 12-in. H-beams for 90-ton load, is pivoted to take long rifle around turns, and pivot is jointed two ways to allow for side sway and unevenness in road.



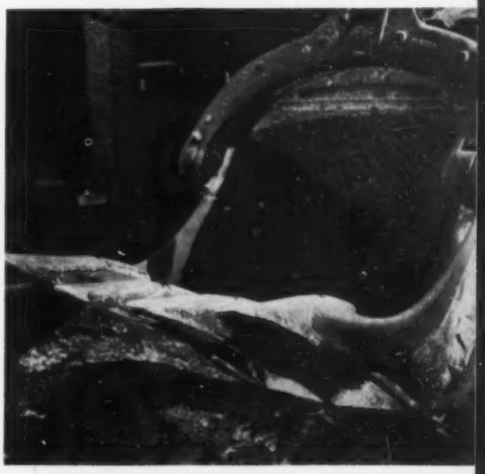
THREE PORTABE FRAMES assist in erection and fitting of bottom plates under forward end of ships at Pascagoula, Miss., yards of Ingalls Shipbuilding Corp. Frames make it possible to weld joints between flat keel plates and A-strake without having to set in inner bottom sections to hold plates in alignment.

DRILL STAND (right) is attached to electric hand drills used in making holes for lag screws on ships at Richmond, Calif., yard of Permanente Metals Corp. By stepping on treadle, operator can elevate drill against and through sheet metal. Devised by CHARLES PORTER, sheetmetal worker, it reduces fatigue and speeds drilling.

Fore 'n' Aft Photo



HEAVY TIMBERS and material for railroad construction and repair work can be handled by new Kalamazoo derrick car (left) which has structural steel frame with 8-ft. boom. It has 3,000-lb. capacity with 360-deg. revolving travel. Rig is clamped to rails to prevent overturn when handling heavy loads.



BROKEN SPRING LEAVES removed from trucks and cut to length are used to hard-face upper and lower surfaces of dipper teeth rebuilt by welding at Andrew Gull Corp. yard, Brooklyn, N. Y. Rebuilt tips wear twice as long as original teeth, according to William Gull, because spring steel is more resistant to abrasion.

FILL FOR RAILROAD SIDING (below) into Army ammunition depot in Delaware is made by Caterpillar diesel wheel tractor with scraper and pusher tractor operated by Ralph E. Dutcher Construction Co., of Elkton, Md. Haul is about 1 mi.

Spalled Concrete At Hydro Station Replaced With Mix Using *Air-Entraining Cement*

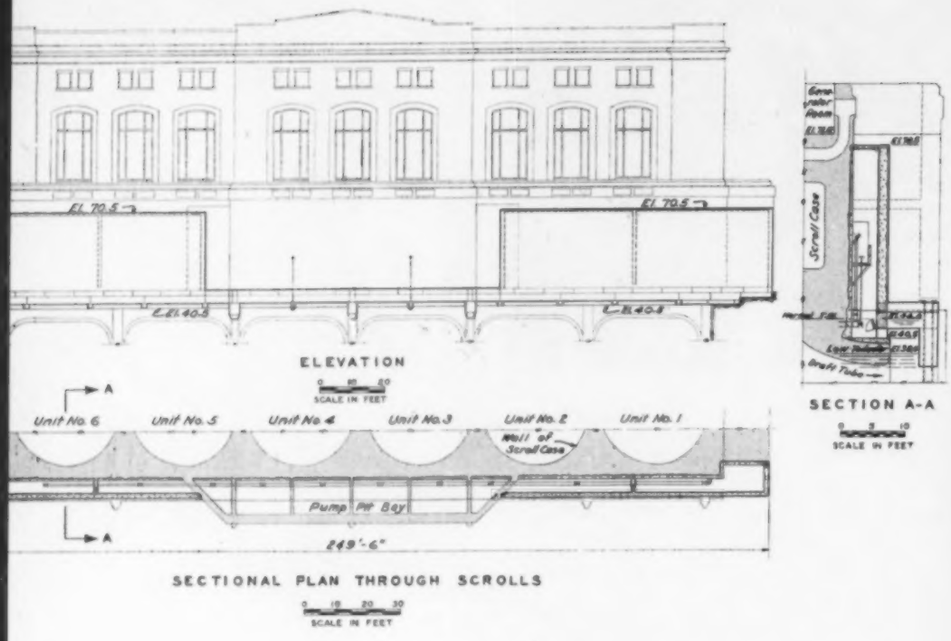


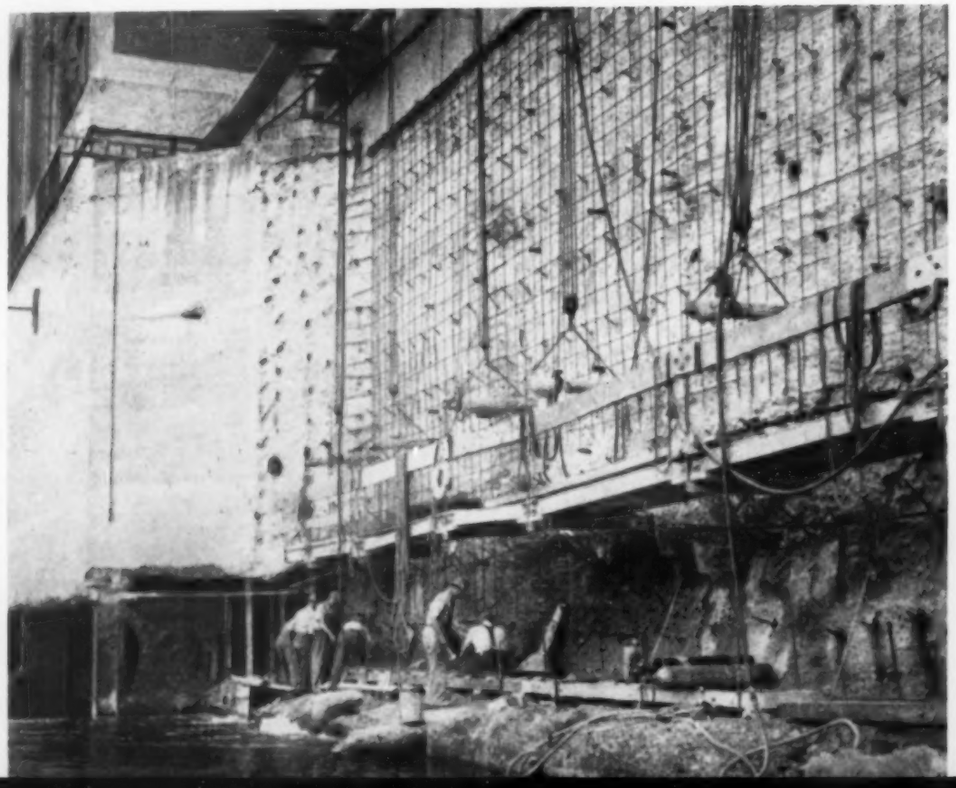
Fig. 1 . . . WHERE SPALLED CONCRETE WAS REMOVED and replaced along riverside face of Cabot hydroelectric station is here shown in elevation and sectional plan through turbine scroll cases. Water under pressure in scroll cases saturated concrete face of structure.

AIR-ENTRAINED CONCRETE APPLIED TO STRUCTURAL REPAIR

Up to the present time concrete made with air-entraining cement, characterized by its plasticity, cohesiveness, workability, and durability, is best known for its use in the paving of highways and airfield runways. Here it has proved resistant to scaling, particularly under conditions involving the use of de-icing salts and alternate freezing and thawing. In the article herewith H. A. Moody records the application of air-entrained concrete in the structural field—the repair of water-saturated walls inclosing the turbine scroll cases of a hydroelectric station which had been damaged by spalling to depths of as much as 24 in. as the result of exposure to the extremely low temperatures of New England winters. Repairs involved the removal of the disintegrated portions of the wall and their replacement with a thick veneer of air-entrained concrete firmly anchored in place by steel dowels. The project included also a new concrete curtain wall. — EDITOR

Fig. 2 . . . ICE FORMATION along downstream face of hydro station (below), opposite scroll cases of turbine units 1 and 2, provides evidence of leakage and freezing, resulting in damage by spalling. Pores of concrete are filled with ice to within few inches of face.

Fig. 3 . . . TO ANCHOR new air-entrained concrete on face of downstream end of station (below), after spalled concrete has been removed, steel dowels are placed and steel reinforcing bars welded to them. View also shows spalling of top surface of draft tube extension at tail-water level.



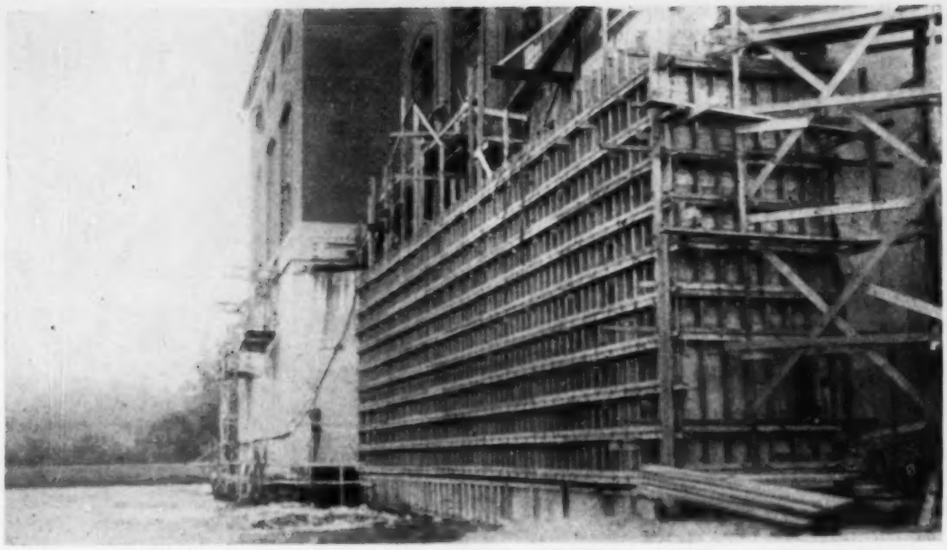


Fig. 3a . . . FORMS are in place to receive concrete at downstream face of hydro station.

BY H. A. MOODY
Hydraulic Engineer
Western Massachusetts Electric Co.
Turners Falls, Mass.

CABOT STATION is a hydro station of 50,000-kw. capacity located on the Connecticut River at Montague City, Mass. It is one of several hydro stations in the system of the Western Massachusetts Electric Co. and was first put into operation in 1916, it now being 28 years old.

The layout of the six turbine scroll-cases constructed in the foundation concrete of the building is shown in Fig. 1. These scrolls are but 4.5 ft. back from the river face of the building at the nearest point and, 13 ft. high, they operate under a hydrostatic pressure of 17 lb. per sq. in. at the top and 23 lb. at the bottom. Since there is no impervious lining in these scrolls the river face of the foundation concrete is always saturated to a point somewhat above the top elevation of the scrolls and subjected to the extreme low temperature of New England winters.

The top of the draft tube concrete is 11 ft. below the elevation of the bottom of the scrolls and in this 11-ft. band for the entire length of the station severe spalling occurred, extending back into the concrete to a depth of 24 in. in places. From this band to the top of the saturated area the spalling was from 8 to 12 in. in depth at the downstream end of the station, but only about half of this depth at the upstream end.

Fig. 2 is a view, taken in March of 1944, looking along the downstream river face, opposite units 1 and 2. The ice clinging to the concrete indicates leaks through the concrete which finally developed because of freezing. Evidence exists that in winter the pores of the concrete are filled with ice to within a few inches of the face of the scrolls and opposite each scroll are a series of vertical cracks parallel to the outside face and of a length equal to about one-half the maximum width of the scroll.

When considering the method of repair and cure to prevent repetition of

Fig. 4 . . . CONDITION OF BUILDING FACE at upstreams end, opposite turbine units 5 and 6, shows spalling less severe than at other places. Here surface was restored by concrete placed behind forms for lower 7 ft. and by Guniting and wire mesh above that level.

Fig. 5 . . . SUSPENDED SCAFFOLD provides means for Guniting station face along upstream end.

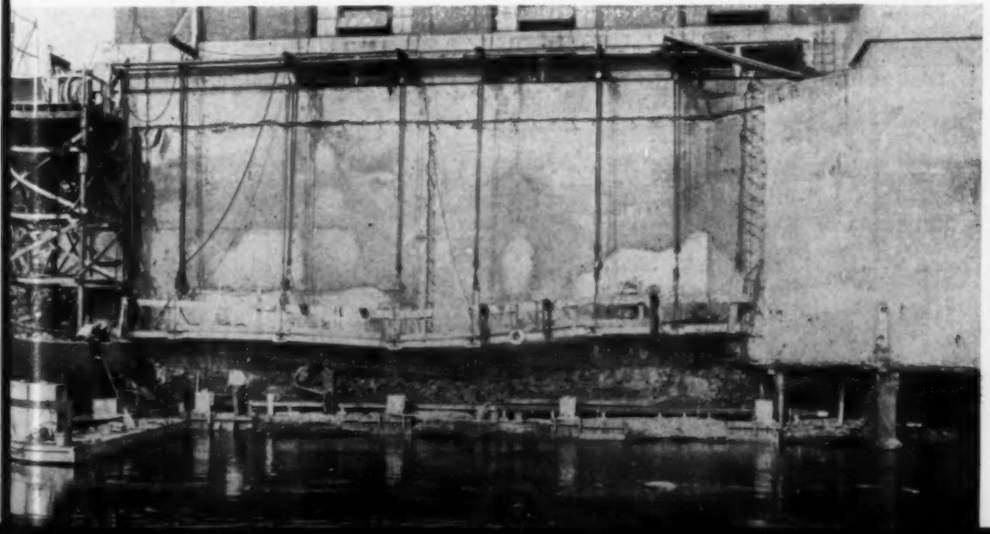
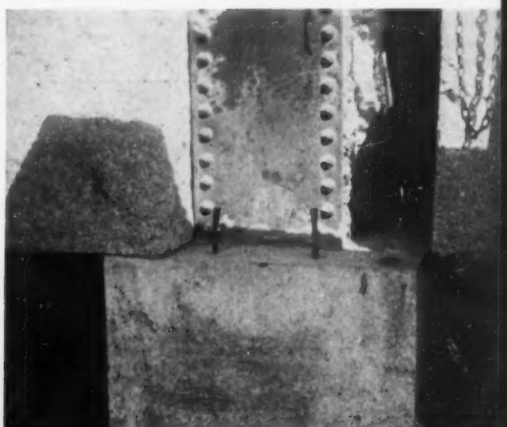


Fig. 6 . . . STEEL COLUMN of pump pit bay is surrounded by granite which extends below minimum water level.



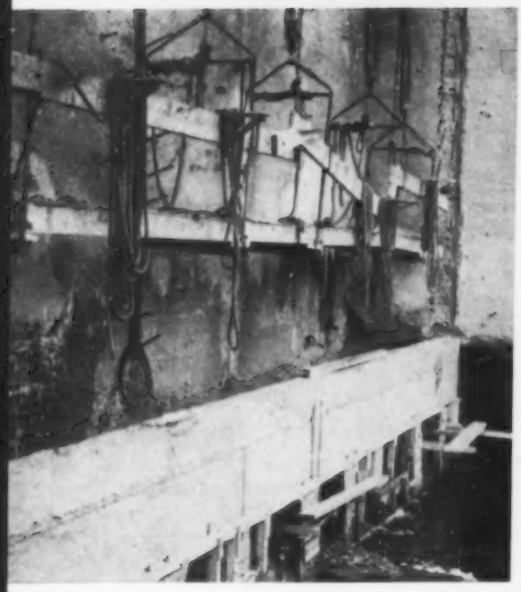


Fig. 7 . . . BAND OF GRANITE forms lower 4 ft. of protecting wall. Above it is scaffold from which repair of face was carried on.

Fig. 9 . . . TRUCK MIXER is ready to discharge batch of concrete into 1½-cu. yd. bottom-dump bucket suspended from station crane.

existing conditions it seemed hopeless as well as very expensive to apply an impervious lining successfully to the inner face of the scrolls now black with river slime after 28 yr. of use. This method was carefully investigated, but no process which was considered offered assurance that saturation would not again occur. The most definite cure appeared to be to protect the saturated concrete from freezing temperature by constructing an 18-in. concrete wall at the outer face of the draft tubes which extend 6 ft. into the river beyond the building face, as shown in Figs. 1 and 2.

The building as originally constructed included a so-called pump pit bay opposite units 3 and 4 extending out into the river 13.5 ft. and supported on steel columns 37 ft. on centers which are inclosed in walls 24 in. thick extended out between the draft tubes. The curtain wall of this bay was dropped down below the floor of the pump pit to within 1 ft. of the normal tail-water level, but surge of the water from the draft tubes saturated the bottom 6 to 8 in. of this wall which became badly spalled as shown in Figs. 2 and 3.

Fig. 3 shows the tail-water level when the station is not operating, a condition occurring at times in February from Saturday noon to Monday morning when the river flow permits ponding water for the week-day load and when the temperature is well below freezing. This view shows the conditions of the concrete wall which formerly surrounded the steel columns. This view also shows the spalling of the top surface of the draft tube extension. Forms for concreting the face are illustrated in Fig. 3a.

Dowels Anchor New Concrete

At the downstream end of the station the disintegrated concrete was removed from the face of the building, 1-in. steel dowel pins varying from 4 to 5 ft. in length and spaced 2 ft. horizontally and 3 ft. vertically were grouted into the old concrete on an angle of about 20 deg. to which were spot-welded ⅝-in. reinforcing rods spaced 12 in. on centers, as

(Continued on page 152)

Fig. 8 . . . 5-TON GRANITE BLOCK is handled by crane from truck to transfer car.

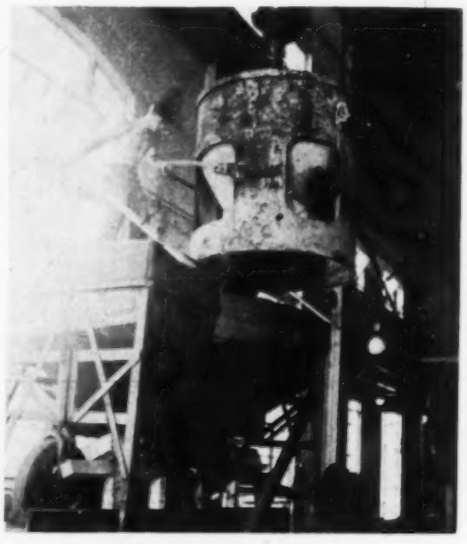
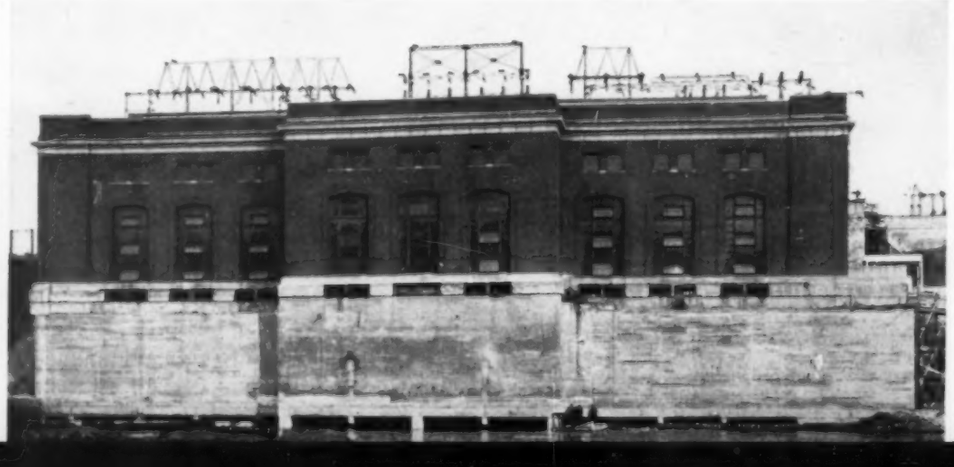


Fig. 10 . . . ELEVATED HOPPER of 4-cu. yd. capacity receives concrete which is delivered to forms by chute extending from top of walls.

Fig. 11 . . . ABSENCE OF SEGREGATION of air-entrained concrete (below) is shown as mix passes down chute into forms.

Fig. 12 . . . ALMOST COMPLETED is project of repairing hydro station (below) by application of air-entrained concrete and construction of new curtain wall.



CUTTING OF CEMENT-ASBESTOS PIPE is done by electrically powered Skilsaw equipped with Felker abrasive blade, a thin metal disk with diamond dust embedded in its periphery.

SMALL TOOLS ON CONSTRUCTION

A special pictorial section illustrating applications of hand-operated and power-driven tools

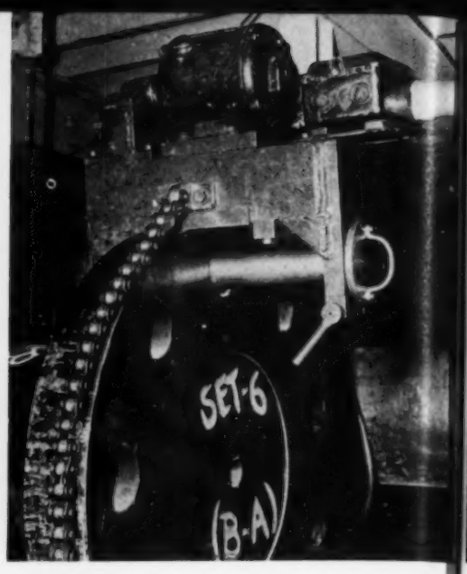
● For the seventh consecutive year *Construction Methods* presents herewith a pictorial feature designed to indicate to engineers and contractors the scores of time-saving, cost-cutting applications of hand-operated and power-driven tools available for their use.

Construction men today realize that while heavy-duty equipment must play the major role in their operations, every job offers countless opportunities for the profitable use of light-duty tools. In mass housing and shipbuilding—to name only two of the many types of construction which have been conspicuous in the nation's war effort—the use of small tools has become widespread and effective. It would be difficult to cite any kind of work that construction men are called upon to perform that does not involve such basic operation as sawing, drilling, jacking, cutting, pulling, pushing, turning, hammering, chipping, bending, grinding, tamping, boring, pipe-threading, bolting and surface finishing.

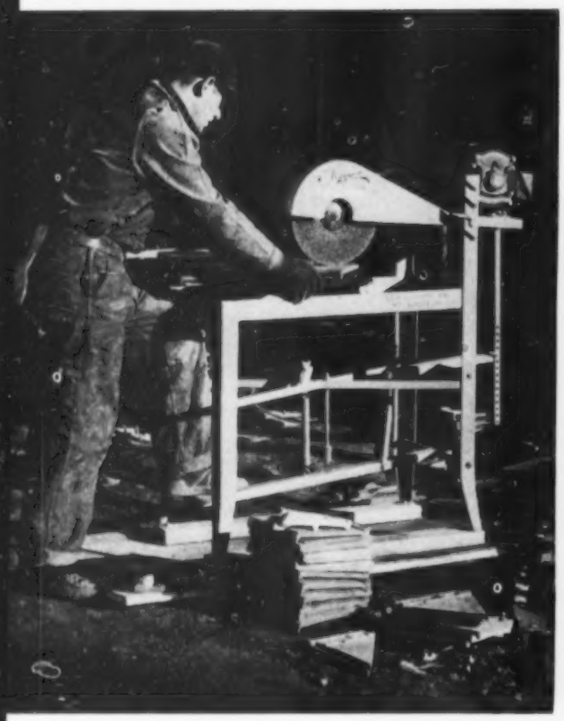
Tools, many of them power-driven, are available to handle the entire gamut of such duties. The illustrations on this and the following pages show how they may be applied, particularly in these war times when manpower is at a premium throughout all American industry.

SMALL TOOLS ON CONSTRUCTION

CLEAN HOLES IN STEEL PLATE are cut by Clark adjustable hole cutter in Stanley portable electric drill. Cutter consists of three high-speed steel blades set in shank.



TAPERED BORES in propeller shaft flanges o Victory ships built at Kaiser shipyards in Rich mond, Calif., are produced by new-type machine It is comparatively light unit and uses single bo ing bar adapted to making all roughing an finishing cuts in bore.



ROOFING TILE is cut by Clipper masonry saw. Completely portable, saw is powered to cut brick, glazed tile, concrete building units and refractories of all kinds. Pressure equalizer increases cutting efficiency. Control is by foot pedal. Conveyor car is teeter-proof.

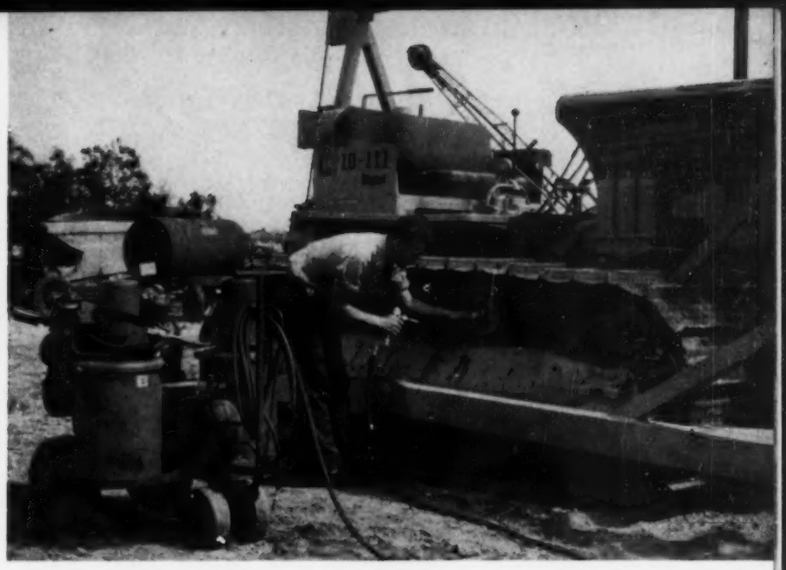
VIBRATORY SCREED used to level off and compact concrete pavement is equipped with Mast vibrating unit.

WIRE BUFFER (below), made with pair of circular wire brushes driven by air motor, is used in Kaiser shipyards at Richmond, Calif., to remove scale from coils of welding wire used in Union Metal machines.

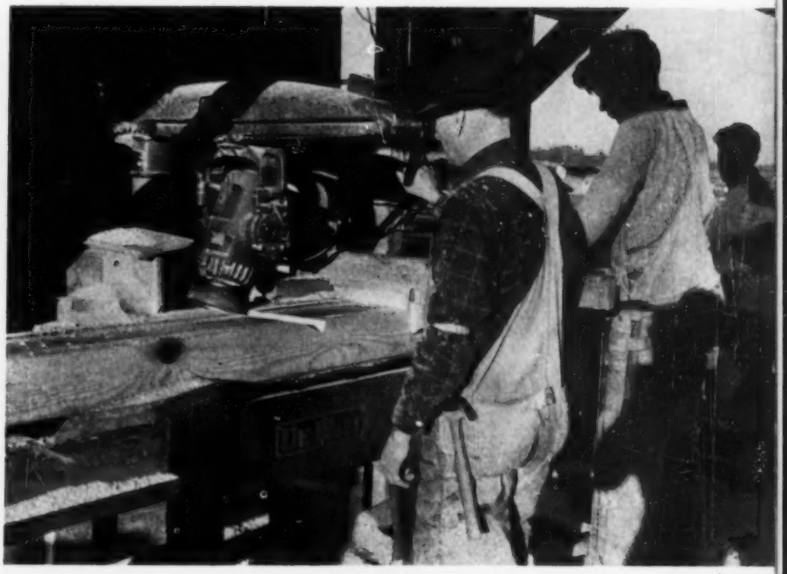
PROTRUDING BOLT END is severed flush with surface by jaws of Porter end cutter (below). Largest size tool has capacity up to ⅝-in. bolt. Cut is made in one handle movement. Tool 36 in. long, weighs 13 lb.

ASSEMBLY OF PIPE RAILS is made easy by u of Walworth Parmelee wrench (below) whi leaves no unsightly burrs to scratch hands. T is available with girths in number of sizes handle rods, tubing and other cylindrical objec

FOR FELLING (above) or bucking trees, Lowther gasoline powered portable saw, with 30-in. dia. blade, can be operated by one man. By adjusting blade to proper angle after tree is cut down, he can perform entire limbing operation and then, adjusting blade to upright position (below), cut timber to right length for handling. Frame is of welded tubular steel and saw mandrel is equipped with two Timken bearings. Saw speed is 1,150 rpm.



FIELD SERVICING of Caterpillar tractor is done with aid of Graco Fleet Luber. Equipped with 1¾-hp. air-cooled engine and 6-cu. ft., 2-stage air compressor with automatic pressure control switch and gage, it includes one 50-1 ratio pump for chassis or track lubricants and one 6-1 ratio pump for dispensing gear lubricant. Unit, 46 in. long, 39¾ in. wide and 48¼ in. high, weighs 650 lb.

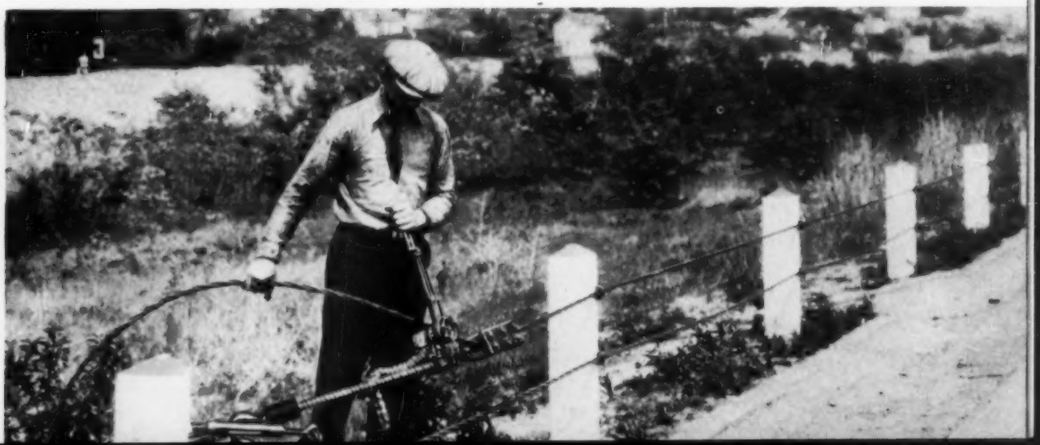


RAFTER NOTCHING HEAD on 7½-hp. DeWalt saw makes full heel cut on eight rafters at one time in 4 sec. cutting time.

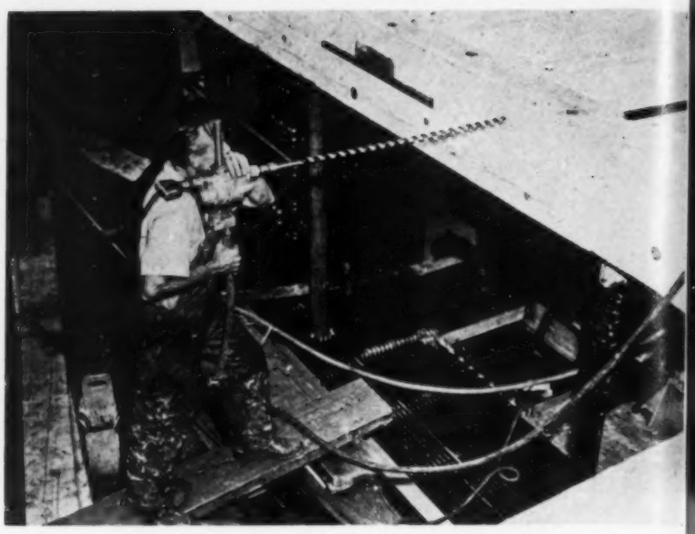
FOR CUTTING METAL on curves as well as on straight lines this Crescent combination snip (right) is a useful tool. Here shown in use by mechanic on installation of an air-conditioning system.

ROUGH EDGES of sheet steel are smoothed by Cleveland grinder (below).

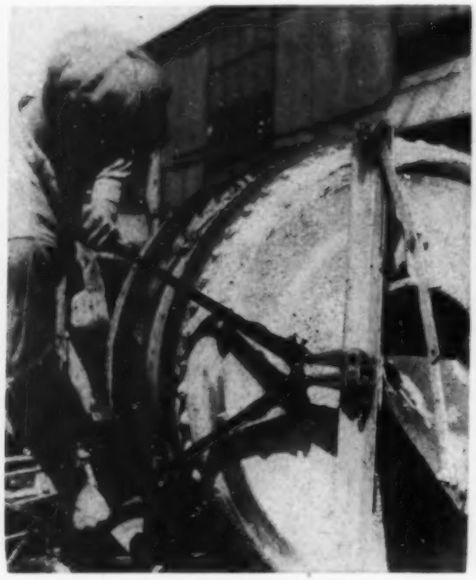
WIRE CABLE on highway guard rail is tightened by Yale & Towne Pul-Lift tool (below).



STREET SURFACE is opened up for sewer trench by Cleveland paving breakers supplied with air by Schramm portable compressor.



LONG AUGER operated by Thor pneumatic drill bores holes in wood deck girder and beam of mine sweeper. Tool weighs 16¼ lb. and has capacity up to 1-in. hole.



RUSTED NUT on frame of concrete mixer is split by Porter nut splitter without damage to bolt. Tool weighs 17 lb. and is 42 in. long.

HYDRAULIC BENDER, made by Greenlee, makes smooth, accurate bends in pipe up to 4½ in. in diameter. Bends can be made in less than 5 min. without kinks, scratches or other damage.

HEAVY PIPE SECTIONS are maneuvered into position for jointing by Yale & Towne hand-chain spur gear hoist rig (below) on wooden gantry crane.

CONCRETE IS CUT by Felker diamond abrasive blade on portable electric saw (below.) Thin blade is of copper or steel with diamond dust embedded in periphery.

LIGHTWEIGHT WHEELBARROW (below) weighing only 32 lb. is made of new Dowmetal magnesium. When loaded with 400 lb., a lift of only 60 lb. is required to move the barrow.

RAILWAY TRACK BALLAST is compacted by an 8-unit Jackson tamper outfit operated by portable gasoline driven 5-kva. electric generator. Tampers are equipped with step-cut steel blades.

TREE IS FELLED by 5-hp. Mall gasoline chain saw with automatic clutch which prevents stalling of engine when chain is pinched or forced too hard.

CUTTING WORN TIP from dipper tooth, operator in maintenance shop of New Hampshire Department of Highways uses Airco oxyacetylene torch and No. 2 burning tip. Cut is made above weld to facilitate work.

TO CONSOLIDATE CONCRETE on floor of building hand-operated screed is equipped with Syntron vibrating unit.

TO MAKE TIGHT FLEXIBLE JOINTS with Dresser couplings only tool needed is ratchet wrench (below).

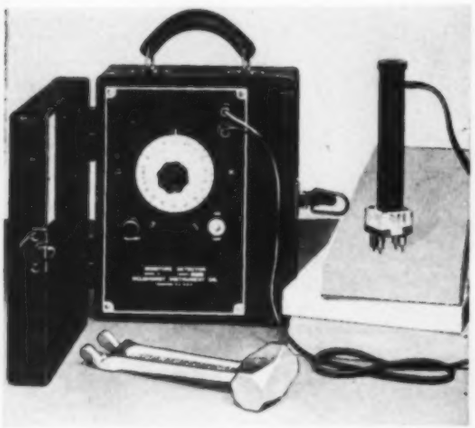
HANDY ANDY VISE STAND (below), manufactured by Western Wire Products Co., is light, strong, portable unit 36 in. high. Weight, 32 lb.

TAMPING OF FILL on dam in western state is done with Barco gasoline hammer (below) weighing 96 lb. and designed for heavy-duty service.

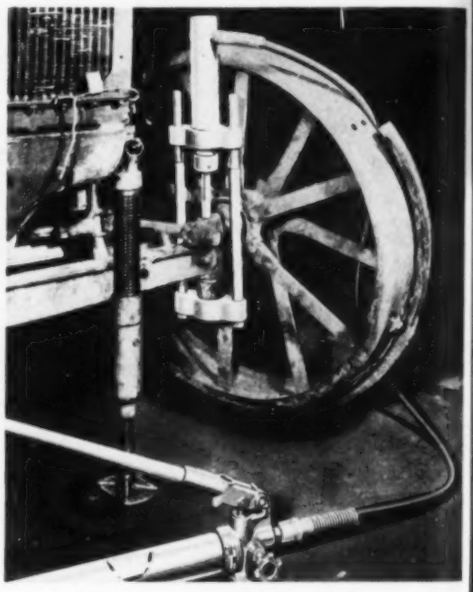
DRILLING FOR DEMOLITION in Greenland, U. S. Army Engineers use air hammer hose couplings made by Hose Accessories Co.

GROOVES FOR SPLIT RING CONNECTORS are prepared by Timber Engineering Co. Combination boring and grooving tool made with removable and replaceable blades of high speed steel attached to Delta drill.

SMALL TOOLS ON CONSTRUCTION



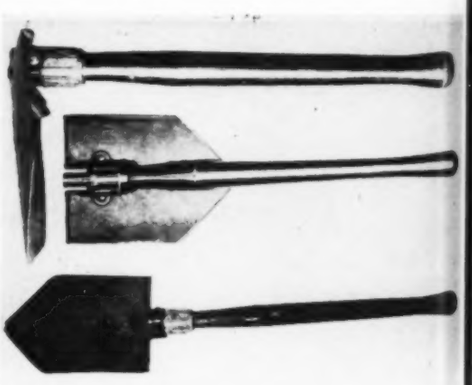
QUICK MOISTURE DETERMINATIONS are provided by 7x4x8¾-in. Delmhorst moisture detector, made by Colloid. Battery operated. Weight, 6 lb.



SPINDLE PIN of tractor sent to shop for repair is pushed out by portable press coupled to Blackhawk hydraulic Porto-Power jack. Press is used with pusher pin attachment on ram head.

INTERNAL VIBRATION of concrete for ship construction is done with Viber electrically operated unit (below) equipped with 1¾-in.-diameter vibrating element designed for use where steel reinforcement is closely spaced. Operating rate is 9,500 pulsations per minute.

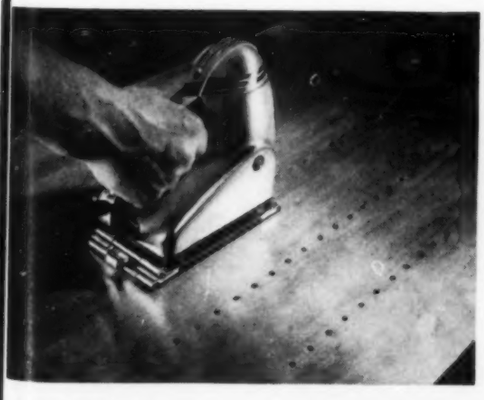
CONCRETE SPADE (below), made by Union Fork & Hoe Co., is specially designed for use within concrete forms.



NEW ENTRENCHING SHOVEL for use by U. S. Army is adaption of captured German tool modified and improved by Quartermaster Corps. Top view shows implement as pick, middle view shows blade folded back for carrying and bottom view shows blade locked in position for use as shovel. Knurled nut locks blade in any of three positions.

CABLE SLINGS of 1½-in. wire rope are tested to 45 tons by Simplex Jenny center hole hydraulic puller. Device can be used in any push-pull operation in which rod can be fitted through center hole so that force can be applied by ram.

FAST LOCKING is feature of Jenkins heavy-duty vise, set and released by Bar-Lok push-pull unit requiring only a quarter turn of handle to lock or release. Opening is 4 in.

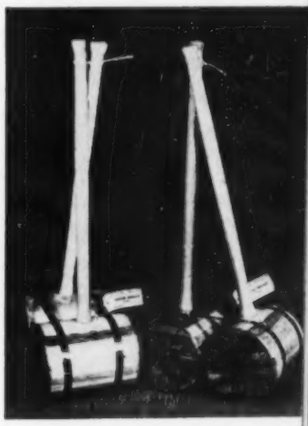


SCRATCHES, WELD MARKS and surface defects are removed from sheet metal by Sterling portable electric sander.

TROUBLE SHOOTING CREW of a Southern California Telephone Company is equipped with clay digger operated by Ingersoll-Rand truck-mounted air compressor.

FIRE TORCH (below) made by Littleford is useful as weed burner, as well as in heating and thawing operations.

SHORTSTUB ELECTRODE HOLDER (below) is designed by National Cylinder Gas Co. to permit visibility while welding, maximum accessibility for deep pocket work and fast loading and reloading.



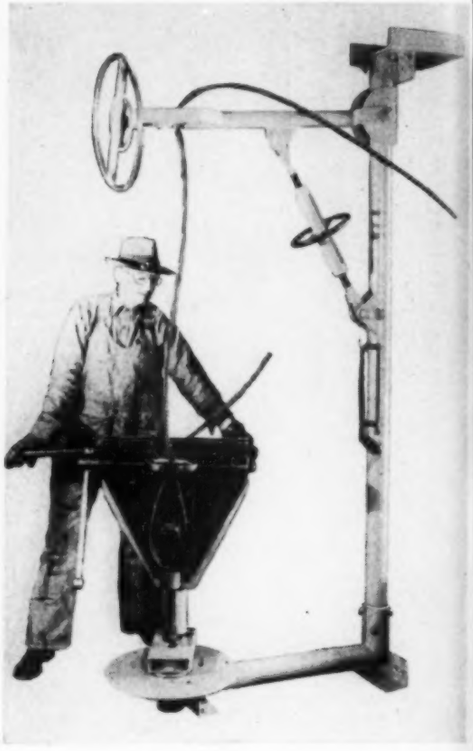
LAMINATED, KILN-DRIED HARDWOOD is used in heads of McLean mauls (right). It is chemically treated and glued under pressure with urea-formaldehyde glue which is non-soluble in water after setting. No metal bands are used.

TIMBER PILE TOPS (below) for pier construction by W. H. Ellis & Son, Boston, Mass., are cut off by Reed-Prentice portable 24-in. chain saw operated by compressed air.

MULE PACK CHAIN SAW is developed for use by U. S. Army Engineers. Disston-Mercury unit is powered by gasoline engine and cuts 24-in. timbers in 20 sec. Weighing 95 lb., unit with accessories and fuel supply can, is transported on mule's back.

ELECTRIC SCREWDRIVER is supported over production line by Appleton Retract-o-Reel. When operator finishes using tool (left), spring operated balance reel lifts it out of way. Reel can support portable tools weighing up to 10 lb.

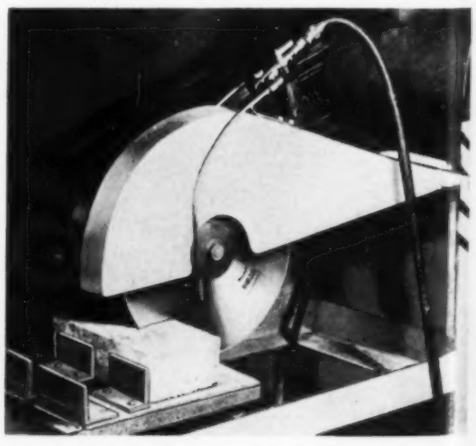
SPLICING WIRE ROPE is facilitated by Gar-Bro cable-splicing rig (right) to which any standard splicing vise can be attached. Perforated shelf mounted on back of vise stand holds hand tools. Weight, without vise, 325 lb. Overall size, 96x45 in.



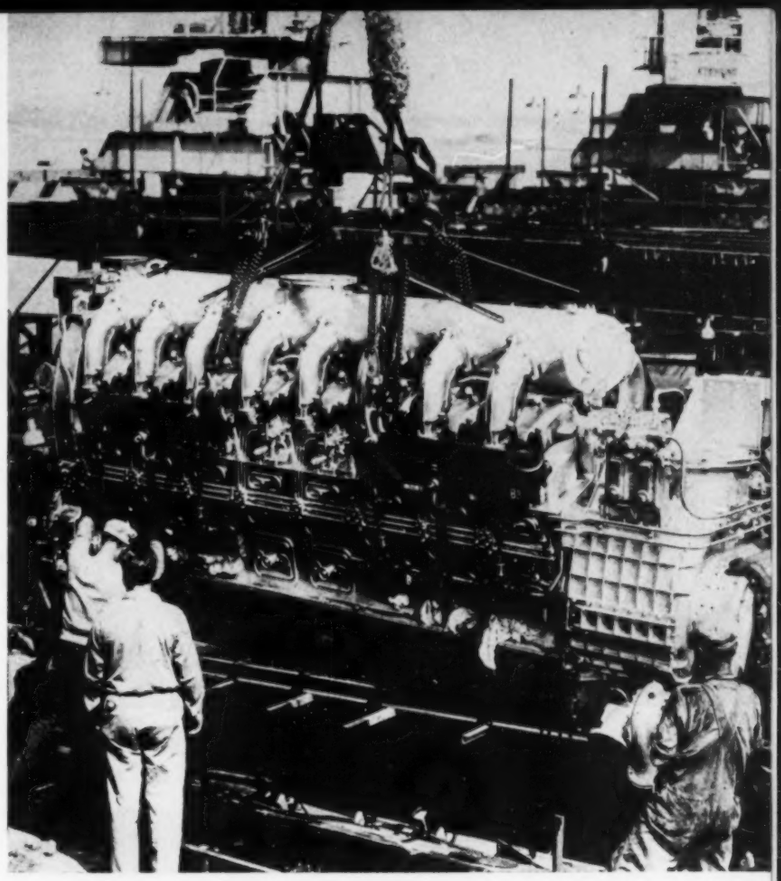
FLAME-CUT DIPPER TOOTH (below) is smoothed and scarfed on Oxaluma wheel turned by Hammond grinder in preparation for V-joint weld with new tip cut from Manganal manganese steel applicator bar, at Concord maintenance shop of New Hampshire Highway Department.

ONE MAN using Precision power chain bow saw (below) cross-cuts small tree. Equipped with 3½-hp. gasoline engine, 38-lb. tool pulls toothed chain at cutting speed of 1,300 rpm.

BRICK, MARBLE AND GRANITE may be cut by Felker thin, diamond abrasive blade (below).



EAD OF WORKER is protected from falling objects by Skullgard, made by ine Safety Appliances Co. Made of pressure-molded laminated bakelite, t has tremendous strength.



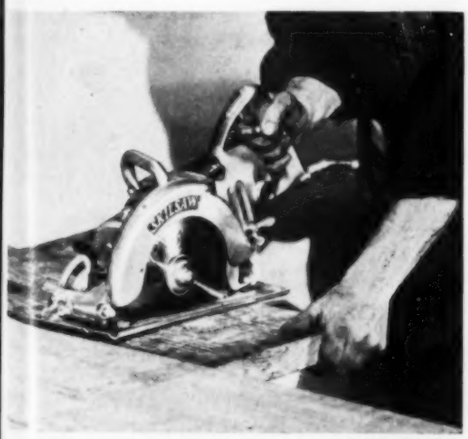
DIESEL ENGINE (right) is lowered into hull of undersea craft, using four Coffing safety-pull ratchet lever hoists to spot it accurately on its base. Hoists weigh 59 lb.

TAMPING OF EARTH for sidewalk repair is done with Syntron gasoline hammer equipped with special tamping head.

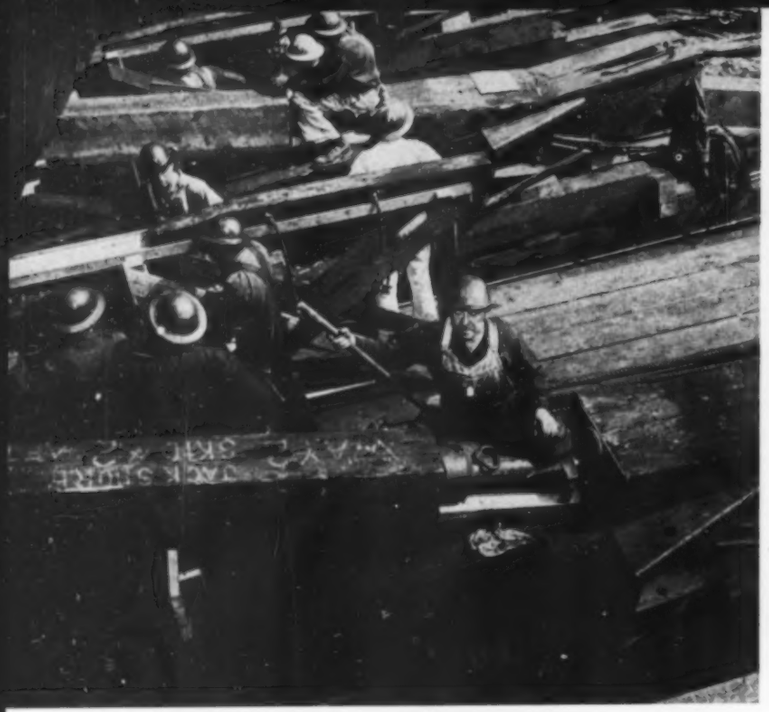
OPAQUE WHITE TAPE of unusual strength is applied by White edging machine to edges of tracings, blueprints and other data sheets to prevent tearing.

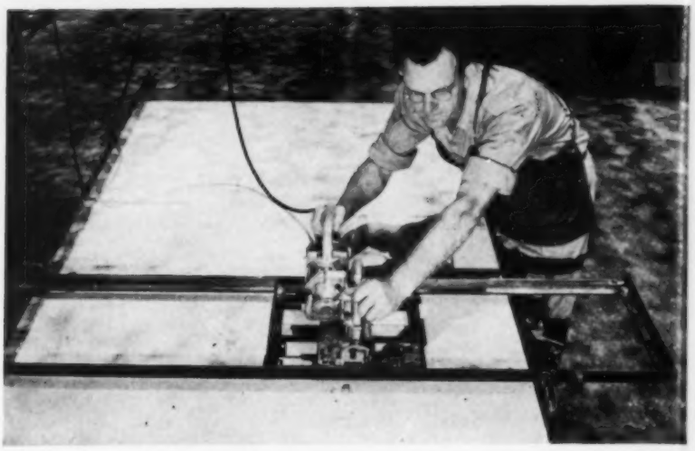
SHEET PILING (below) on sewer project is forced down by Chicago Pneumatic sheeting driver which does work of ten men with mauls and eliminates "brooming" on sheeting ends.

CUTTING 3¾ in. deep in wood, this Skilsaw model (below) is 17¼ in. long and weighs 15 lb.



TIMBER BORING in shipyard is done with 1-in. heavy duty electric drill (below) made by United States Electrical Tool Co.





HEAVY-DUTY SCREW JACK (left) of Duff-Norton manufacture is one of battery used to start ship down launching ways. Jack is used to give horizontal shove rather than vertical lift.

PLYWOOD AND MASONITE SHEETS are cut to desired sizes by Stanley electric safety saw with special fixture which permits cutting of material lengthwise or across. Saw has cutting capacity up to 2¾ in.

SMALL TOOLS

ON CONSTRUCTION

PREPARATORY TO PAINTING, structural steel of trestle at coal pocket is scaled and wire-brushed by Ingersoll-Rand pneumatic tools.

CONCRETE SURFACE is vibrated by portable Baily machine (below) which consists of surface vibrating pad shod with steel, on which is mounted vibrator mechanism resiliently attached to pad. It is powered by 1½-hp. gasoline engine. Weights carried on floating motor base to impose constant pressure on surface of concrete can be increased or decreased at will.

PORTABLE ELECTRIC GENERATOR of Homelite manufacture supplies power for operating 9-in. saw on railroad maintenance work.

THREADING OF PIPE ¾ in. in diameter is done on Oster portable pipe machine (below) weighing 280 lb. and designed for use on construction jobs. Height, 18 in.; width, 19½ in.; length, 46 in.

PAINT IS SPRAYED on exterior walls of war housing project by DeVilbiss equipment having long reach. Air pressure is supplied by portable compressors. Operators wear protective masks.

FORM STAKES are driven by Ingersoll-Rand pneumatic hammer powered by portable compressor.

PARTS NUMBER is permanently marked by 16-oz. Ideal electric etching tool. Unit, 6⅝ in. long, can be used on any kind of material.

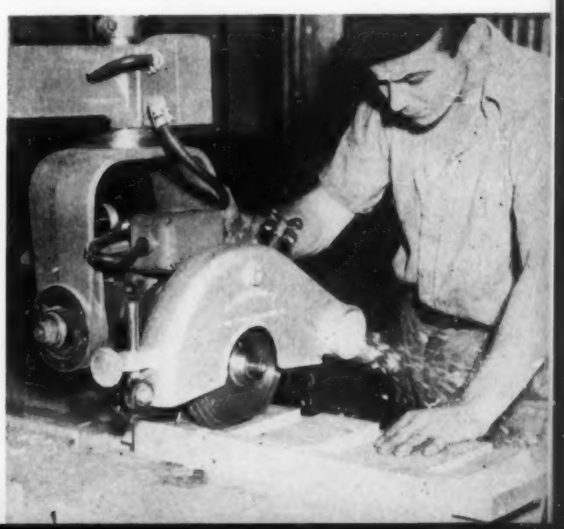
WATER FOR WORKERS is provided by portable drinking cup equipment produced by U. S. Envelope Co. Unit includes steel water tank, paper cup dispenser, waste cup bag, and adjustable straps for carrying it on back or at side.

HOLE IS DRILLED by 8-lb. Skilsaw drill which has 1-in. dia. capacity in wood and ½-in. capacity in steel.

ONE-INCH RIBBON of wet glue is applied to studding by Laucks glue gun (below). Glue carried in reservoir handle can be laid at rate of 300 ft. per min. for plaster, masonry and wood.

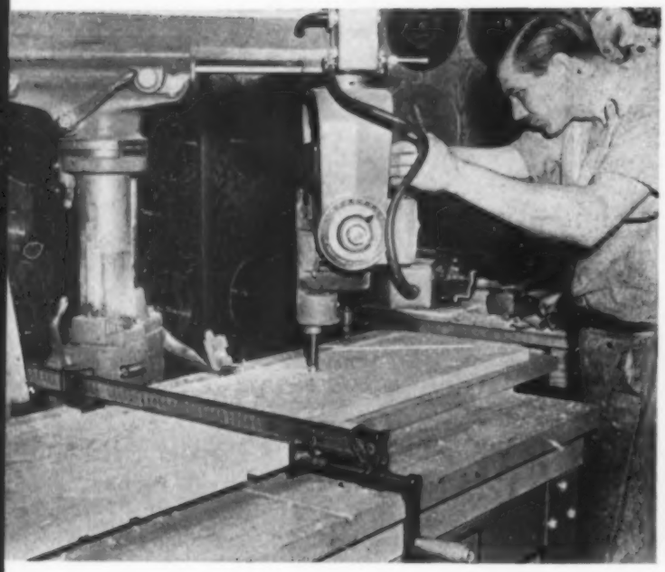
ELECTRIC HAND SAW (below), made by Porter-Cable, cuts wood, slate, tile, marble and light metals. Equipped with steel saw blades or abrasive wheels, it is built in four sizes.

RADIAL SAW of Walker-Turner manufacture (below) is used to cut grooves in lumber.



SMALL TOOLS ON CONSTRUCTION

STRUCTURAL WRENCH is standard equipment with steel workers. Abrupt offset and angle of handle on Williams tool provide clearance of obstructions. Long tapered handle is useful for lining up bolt holes when erecting steel.

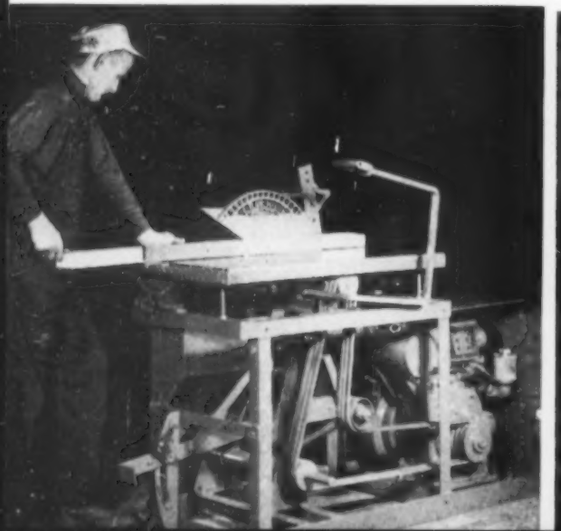


GROOVES FOR STAIR TREADS are cut by Walker-Turner radial saw.

GRIPPING ON SIX SURFACES, Williams' hex-box wrench provides capacity and leverage for tightening 2-in. nut. No danger of slippage as operator pulls on 30-in. handle.

FINISHING OF CONCRETE FLOORS for housing projects and garages is done with Whiteman light weight, small diameter machine with rotary blades powered by small gasoline engine.

PORTABLE SAW RIG (below) on large defense job, is C.H.&E. welded steel frame unit powered by 8-hp. air-cooled engine housed in back of table. Table top tilts to 45 deg. 16-in.-dia. blade makes 4-in. cut.



JACKBIT GRINDER (below) reconditions drill steel of Sunderlin & Watrous, Inc., used during dredging of Kennebec River in Maine.

SIDE WALL for foundation is stripped by Chicago Pneumatic clay digger (below).

SHIPBUILDERS ARE KNOWN BY TOOLS THEY CARRY

SHIPYARD WORKERS in the accompanying pictures taken in the yards of the Permanente Metals Corp., Richmond, California, can be linked with their jobs by the tools hanging from their waists. Check your answers with those on next page.

1. These double bottoms belong to: a. Joiners. b. Separators. c. Pipefitters. d. Maintenance electricians.

2. This spud wrench is used by: a. Chipper. b. Bolter-on. c. Rigger.

3. Here is stern section of: a. Arc welder. b. Burner. c. Heater.

4. Wrench and hammer strapped to this man's aft mean he probably works as: a. Shipwright. b. Millwright. c. Wheelwright.

5. These tools are used for repair work by: a. Plumber. b. Janitor. c. Machinist.

SMALL TOOLS ON CONSTRUCTION

FOR CUTTING TREES and clearing away underbrush wheel-type tractor is equipped with Jaques power saw. Circular blade is mounted on side-arm which controls position of cut.

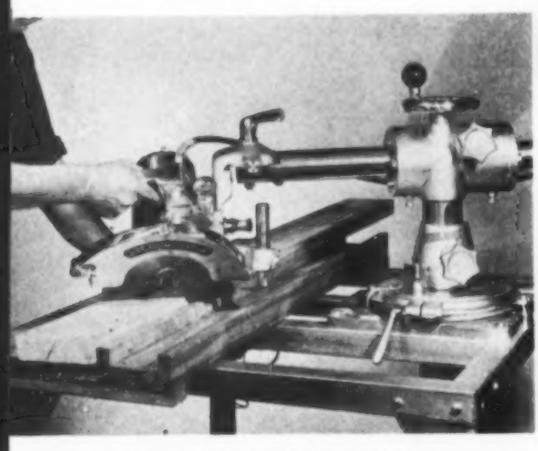
IN BACKFILLING PIPE TRENCH, Chicago Pneumatic tamper compacts earth and eliminates hauling away of surplus excavated material.

FROM ONE SHORT TRENCH, Greenlee hydraulic pipe pusher (right) drives pipe full length necessary through ground under flooring. Built as one compact unit, it operates at six different speeds to match varying soil conditions. Handles pipe from ¾- to 4-in. dia.

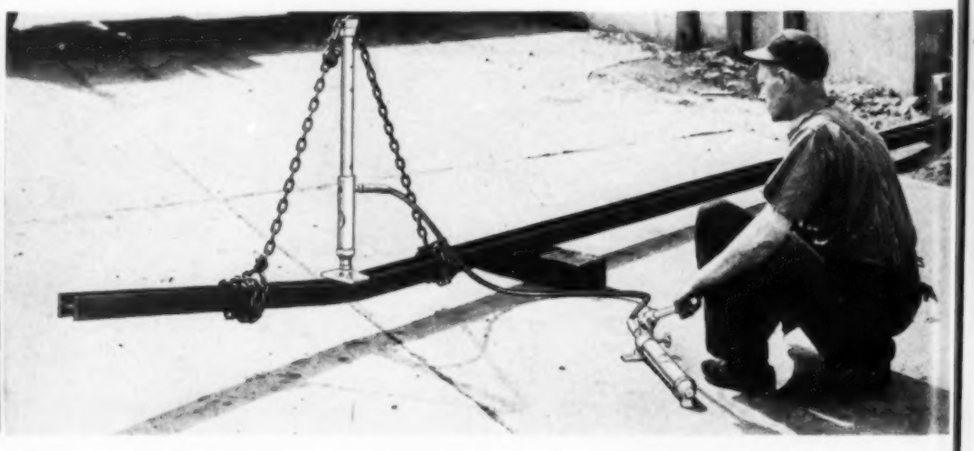
ANSWERS TO SHIPBUILDER QUIZ ON PRECEDING PAGE

1. d; 2. c; 3. b; 4. c; 5. a

RADIAL ARM of Porter-Cable make is attached to Speedmatic saw (below) and anchored to metal stand. Blade is adjustable for making miter cuts. When equipped with dado head, rig dadoes, ploughs, grooves and tenons.



STEEL MONORAIL is bent with aid of Blackhawk hydraulic jack (below). Base plate is threaded onto plunger of ram, which is upside down. Extension gives set-up necessary height. V-block cradles chain for pull.



Power-Driven Tools Aid Victory Shipbuilders

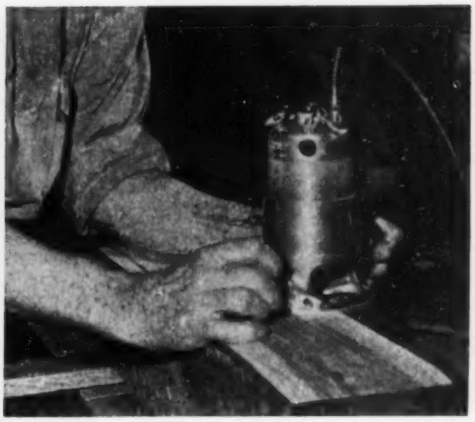
THE PHOTOGRAPHS HEREWITH, taken especially for Construction Methods, illustrate the wide range of applications of power-driven hand tools by the Oregon Shipbuilding Corp. which is constructing Victory ships for the U. S. Maritime Commission at its yards in Portland, Ore.

GRINDING with Ingersoll-Rand air-powered multi-vane tool.

DRILLING with Skilsaw electric drill.

CHIPPING with Chicago Pneumatic tool.

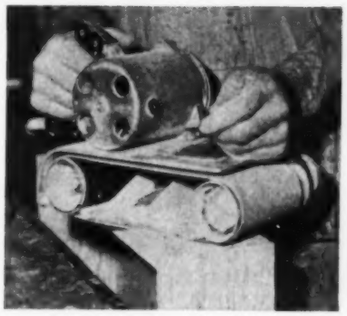
SMOOTHING with Albertson 7-in. electric sander.



ROUTING with Stanley electric router.

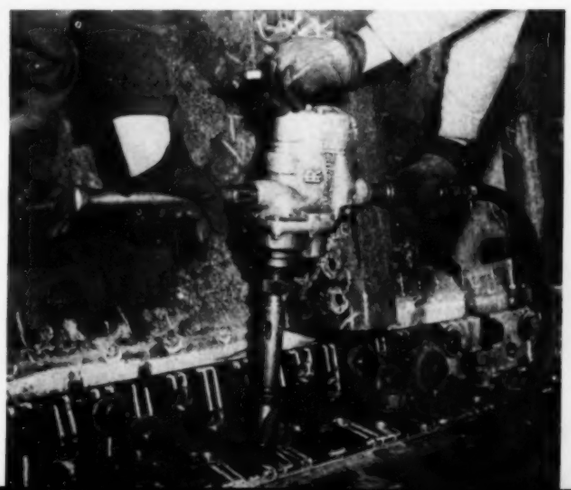
METAL CUTTING with Stanley electric shear (right).

NUT RUNNING (below) with Chicago Pneumatic power-vane wrench.



FINISHING wood surface with Skilsaw belt sander (left).

REAMING with Ingersoll-Rand pneumatic tool (below).



DRILLING with Black & Decker ½-in. heavy-duty electric drill.

HERE'S WORK for Your outfit . . .

ON CONSTRUCTION - - - - - - - - - LOGGING

HERE'S HELP on Equipment and Manpower . .

Contract your Road Construction, Maintenance and Snow Plowing

Avail yourself of contractor's men and machines. If you aren't already doing so . . . contract with construction companies to handle your road building, maintenance and snow plowing. Here is a valuable source of manpower — construction companies with experienced crews. Here is a reliable source of machine power — tractors, scrapers, bulldozers, graders — waiting to be put to work.

Now used by many public bodies, this plan brings relief to communities hit by the manpower and equipment shortage . . . enables them to build and maintain essential roads and streets. Investigate it!

Ask your Allis-Chalmers dealer to help you locate a suitable contractor.

ALLIS-CHALMERS
TRACTOR DIVISION — MILWAUKEE 1, U. S. A.

THIS PLAN SOLVES PROBLEM FOR MONTGOMERY COUNTY, IOWA.

MONTGOMERY COUNTY IS SOLVING LABOR PROBLEM

Montgomery county, like many of the other counties of the state, is solving the improvement of their roads by hiring graders. There has been a scarcity of men to operate the machines and the further fact that the machines owned by the county is almost worn out and impossible to replace them. To carry on the 100 miles of roads the Board of Supervisors have hired Frank Braden and his crew of graders. They also secured an outfit from Frank Klein, who has taken a crew into the county to work.

PAVING THE WAY

Appearing in magazines reaching the proper fields . . . these ads will help keep your organization busy.

THIS IS READ BY HIGHWAY OFFICIALS - - - -

MINING
HERE'S HELP
on equipment and manpower
• Contract Your Logging Roads...
Avail yourself of contractor's men and machines. If you aren't already doing so . . . contract with construction companies to handle your road building and other logging work. Here is a new source of manpower — construction companies with their own men. Here is a new source of machine power — tractors, bulldozers, graders, waiting to be put to work.
Indorsed and backed by the WPB, this plan will help you overcome the manpower and equipment shortage . . . help meet the war requirements of 34 billion feet of lumber for 1944. Investigate it! Let idle equipment boost your production.
Your highway officials or your Allis-Chalmers dealer will be only too glad to help you locate a suitable contractor.
ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U.S.A.
THIS BY LOGGERS
THIS BY MINERS

If you have equipment and manpower at your disposal . . . why not contract with highway officials, loggers and miners to handle their work? Many are in desperate need of help! Your assistance will contribute greatly to the war effort . . . at the same time you will keep your crew intact. To assist in bringing you together, the above series of advertisements is appearing urging the use of the contract system in various fields. Let your Allis-Chalmers dealer serve as your contact man.

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

THE FAR EAST

Frontier for American Enterprise

IN THE great tradition of America, our frontier lies to the West. But for a United States that stretches from the Atlantic to the Pacific, to Go West is to arrive in the Far East. The feet of literally millions of our young men are now set upon that route.

Accomplishment of their objective—the defeat of Japan—will not end our responsibilities to the Orient any more than the defeat of Germany will end our responsibilities to Europe. This time we mean to see the venture through.

The first sketch of a political program for enlisting the strength of nations of good will to enforce the peace was drawn at Dumbarton Oaks. That is a good start. But those who participated know how much work remains before the blueprint becomes a fully matured plan, the plan becomes a structure, and the structure takes life and effective being in the living imagination and will of the peoples of the world.

No political accord, however high its purpose, can endure for long if it depends upon the loyalty and support of populations embittered by hopeless poverty that is offered no promise of relief. The poisonous dust of mass despair makes inevitable an ultimate explosion, whether it be sparked by a torch supplied from without or by its own internally generated heat. Much of the Far East is sufficiently close to that position to pose a grave problem to the Western world. It is of particular importance that American business men and workers alike recognize the nature of their responsibility in the matter, for to them the great area of the East presents also an opportunity and a challenge.

☆ ☆ ☆

The Orient—stretching in a vast semicircle from Manchuria and Japan to India and Ceylon—is the home of more than a billion people, the world's greatest potential market. In its mountains are the earth's richest stores of tin and mica; its deposits of iron ore, coal, and manganese rival those of France, Russia, and the United States. Its rice paddies are the most productive in the world, its coconut and rubber plantations the largest, and its cotton production is of major volume.

And yet, this fabulous region—with its riches of manpower and raw materials—suffers from living standards at the lowest rung of the world scale. With as much as 85 per cent of the populations of this great area devoted to the production of farm products, starvation has been an endemic plague to countless millions of its inhabitants, and will remain so until they graduate from the crudely primitive methods of the crooked stick and the bamboo plow to the use of the implements of a modern world in both agriculture and industry.

The improvement of agricultural methods and the burgeoning of industrial development depends upon tools—a preponderance of simple tools, no doubt, at the beginning, for modernization of economic processes is a development that cannot be forced at a rate faster than the ideas upon which they depend can be developed. If we, in the United States, are to hope to supply a major portion of the implements upon which the salvation of the East depends, we must be prepared to export also the skills and technologies which will make their effective use possible.

The possibility of a world market for machinery and manufactured products is a challenge that American industry cannot afford to ignore. The United States will emerge from the war with almost half of the world's industrial capacity within its borders, with much more than half of the heavy industries. Drastic and painful readjustments are inevitable; but they can be mitigated to the extent that we can find outside markets for the products for which we have excess capacity.

We shall find ourselves, at war's end, in a singularly favored position to compete in any equipment markets which are open. It is not merely that we shall have the productive capacities crying for outlets. Aside from Germany and Japan, which for some time will not be in a position to compete, our two major industrial Allies, Great Britain and Russia, will face enormous tasks in providing for their own rehabilitation. Neither of them is likely to be in a position to export more capital than they absorb; and although Canada, Sweden, and Switzerland will be, the United States will stand alone as the one major creditor nation in the world. If the potential advantages of this position are managed with wisdom and imagination, they will enormously enhance our opportunities for supplying a great share of the capital goods demand of undeveloped areas.

☆ ☆ ☆

What is the dimension of the Far East's potential demand? What are some of the difficulties standing in the way of its being realized?

If needs were the only measuring stick, the Far Eastern market would provide a bottomless pit into which even the great stores of our exportable capacity could be poured with room to spare.

China, alone, with its teeming population of 450 millions, has spelled out needs in dimensions large enough to stir the imaginations of the equipment producers of the world.

Business Week (February 5, 1944) supplements Dr. Sun Yat-Sen's spacious first estimates of the requirements for a thorough-going industrialization program with figures provided by current Chinese planners—25,000 locomotives; 300,000 freight cars; 20,000 passenger coaches; 20,000,000 tons of steel; and 90,000 power driven machine tools for the first five years of reconstruction. An American manufacturer of farm equipment, who recently surveyed the agricultural requirements of China, estimates an ultimate Chinese market for 20,000,000 tractors.

India's drawing-board plans are equally expansive. According to the bold pattern drawn up by a group of Bombay industrialists—some of whom are due to visit the United States early in 1945—India, after the war, will require a capital investment of $2,000,000,000 a year over the next 15 years, of which $250,000,000 per year for the first seven years will be in the form of imported capital goods.

Included on the huge import order list of the Bombay executives are mining, roadbuilding and power station equipment, heavy locomotives, metallurgical plants, agricultural machinery, and a long list of machine tools.

There can be no question of the need of these countries for the industrial equipment—and for many items of manufactured goods—which we are so eminently in a position to supply. But realism requires that we measure this demand against the Far East's probable capacity in the relatively near future to absorb industrial goods.

A Chinese economist has estimated that China, in 1937, had a total industrial capital investment of about $1,000,000,000 in American values, or something like $2.50 per capita of population. In contrast, the American investment, in manufacturing facilities alone, is now more than $600 per capita.

What it could mean in terms of capital goods requirements if China alone carries out this dream of modernizing, not to the utopian level of the United States but to the present modest level of the less developed Soviet Union, is typified by measuring just three lines: 500,000 tons of steel a

year, for five years, to add 12,500 miles to the railroad system; 2,187,500 motor vehicles; 3,300,000 telephones.

But it is one thing to cite mountainous figures demonstrating needs. It is another, and far less optimistic exercise, to find assurance that practical opportunities for satisfying such needs can be made to materialize. Let us face some of the major difficulties and see if they are insurmountable.

☆ ☆ ☆

The first hurdle to be cleared is the question of whether or not we want to promote the industrialization of the Far East. The wisdom of doing so has been vigorously challenged. The negative argument, on the economic side, generally runs thus: If we provide industrial equipment to backward economic areas, we deprive ourselves of the greater long-run opportunity of selling them manufactured articles which our aid has enabled them to produce for themselves.

It is only fair to say that such a thing might happen—that it has happened in isolated instances in the past. But the overwhelming weight of economic history demonstrates that the broader attitude is also the profitable one.

The United States itself is the living refutation of the fear which now cramps the outlook of many of its own citizens.

From 1790 until 1850 the foreign trade of our new fledged Nation had many of the characteristics which pertain to the trades of China and India today. We imported manufactures and we exported raw materials, agricultural products, and newly mined gold. Our imports exceeded exports, the difference being made up partly by payments to us for shipping services and partly by industrial development loans. It is relevant to inquire how the trade of the lenders was affected by this policy of supplying us with industrial capital and machinery.

From 1850 through 1939 the pattern of America's foreign trade changed. Slowly at first, and then at accelerated pace, our import ledger showed a percentage decline in manufactured goods and a percentage rise in raw materials to feed our expanding industrial facilities. But while finished manufactures declined percentagewise in our import budget, so great was the increase in our total foreign trade operations in the century from 1830 to 1930 that our imports of manufactured goods increased more than twentyfold, and they more than doubled between 1900 and 1939.

Clearly industrial Europe gained rather than suffered from the industrialization of the United States, and it is equally clear that we, in turn, shall benefit from the industrialization of the world's undeveloped territories. Further evidence is provided by Canada which, with its high industrial development but only 12 million people, buys from us each year almost as much as the relatively unindustrialized 130 million people south of the Rio Grande.

If it be granted, as I believe it must, that the development of Far Eastern countries will be to our advantage as well as theirs, the second question that we should face is the speed with which it can be accomplished. Is there genuine promise in the proximate future of opportunities for American enterprise of the magnitude set forth in the estimates quoted above?

In all fairness, I am forced to state my conviction that the road is longer than is indicated by Chinese and Indian leaders. It is natural, and far from censurable, that their eyes should be focussed upon the urgency of national needs, rather than upon obstacles in the way of their fulfillment.

On the other hand, it is possible that our own long process of industrialization may lead us to conclusions of undue conservatism. Ideas, once they break the crust of resistance are the most contagious of bacteria, and the tempo of their infiltration seems to increase by geometrical progression in a world of swift communication.

☆ ☆ ☆

In an interesting recent study of The International Labor Office, it is suggested that the general economic level of the rest of Asia outside Japan in the late 1930's was not dissimilar to that of Japan in 1900. Between 1900 and 1936, Japan increased its total capital investment more than threefold devoting between 10 and 17 per cent of its annual income to capital outlays. A comparable tempo of development for China, India, and other Asiatic areas would result in a capital expansion that would dwarf to insignificance the most optimistic blueprints that have been put forth to date. I am not suggesting this as a likely possibility, but rather as a caution lest we, in the name of hard-headed realism, underestimate Asiatic potentials as much as their own nationals exaggerate them.

Finally, in appraising the outlook for American enterprise in Far Eastern markets, we collide, head-on, with the problem of how we are to be paid. Here, hard-headedness can be only a virtue, for the lack of it will breed inevitable disaster for the Asiatics as well as for us.

In the last analysis, the dimension of the American market in the Far Eastern countries will be determined by the dollar exchange at their command, obtained through the products, goods, and services which they are able to provide to us, with due allowance for multilateral trade arrangements. It is true that the balance temporarily can be distorted through the extension of developmental loans. There is little question but that such loans will be in order after the war, and if they are wisely made, for productive projects that eventually will increase the exporting capacities of the countries to which they are extended, they can be thoroughly justified. But the best loans provide only a temporary expedient. In the long run, the balance of current payments must be restored with sufficient margin to provide interest payments and finally amortization of principal.

☆ ☆ ☆

How, then, are we to attack the problem of increasing our imports from the Orient?

In 1937, the total exports of the Far East amounted to something over $5,000,000,000—a little less than $1,500,000,000 in foodstuffs, a little more than $2,500,000,000 in raw and partly manufactured materials, and better than $1,000,000,000 of manufactured articles. Of this total, the United States purchased only about 20 per cent—approximately 10 per cent each of the foodstuffs and manufactures, and 30 per cent of the materials.

Despite changes in our technologies which will probably reduce our future takings of such important items as rubber and silk, the achievement of a high level of economic activity in this country after the war will provide a basis for increasing our Eastern imports, but only if it is an accepted part of our national policy to do so.

This means an alert and aggressive exploration of two-way trade possibilities on the part of both American business and our governmental agencies. It cannot be done by either alone.

The war has dislocated many of the trade patterns that prevailed in the past. The East is hungry for the type of products which we, uniquely, are situated to supply, but it will make its bargains with those who will not only fill its needs but will also provide outlets for its produce. Even the prewar magnitude of the exports from this area provides ample margin for the most meticulous and imaginative shopping of Eastern markets with the aim of increasing the modest share of our prewar purchases. And a farsighted program of development loans can greatly increase the capacity of these countries to produce what we want.

In general, we can trust American enterprise to explore rigorously all likely export opportunities. But the equally vigorous investigation of import possibilities will require a break from past traditions on the part of American business and American government.

Both East and West must learn to think in new patterns for the successful opening of a new frontier.

President McGraw-Hill Publishing Co., Inc.

THIS IS THE 30TH OF A SERIES

LEGAL ADVENTURES of TRACTOR CONN

By LESLIE JOBB

No contractor ever tries to be his own dentist or his own shoemaker. It is even more dangerous for him to be his own lawyer. There are, however, some legal rules which every contractor should know, and these rules may be explained in plain English without resorting to the jargon of the law, unintelligible to most laymen.

This series of articles, dealing with the Legal Adventures of Tractor Conn, a typical contractor anywhere in the United States, explains some of these legal points in plain language for the contractor. Each one is based on an actual decision of an American Court.

The Case of the Bank Guarantee

If a national bank makes advances to Tractor Conn and Conn assigns to the bank the money earned and to be earned under the contract, and the bank gives a guarantee to a jobber for supplies advanced by the jobber to enable Conn to carry on, is the guarantee binding on the bank, or can it escape on the ground that giving a guarantee is beyond the powers of a national bank?

On this point the United States Supreme Court ruled against the bank in a case reported in 42 S.C.R. 286.

"A firm of McGee and McGhee was building a hospital in Aiken. The firm had contracted with the Kaiser Co. for the heating and plumbing, at the price of $7,800, the firm agreeing to pay 85 percent of the labor and materials furnished each month and the remaining 15 at the completion of the system. The Kaiser Co. assigned this contract to the bank and the firm agreed to make all checks under the contract payable to the bank. This was done as security to the bank for advances the validity of which is not contested. In the course of performance the Kaiser Co. ordered the goods concerned from the respondent, but the respondent required security before it would send them. Thereupon the bank, in order to enable the company to complete its contract and thereby to repay the advances that the bank had made gave the guarantee in question. Subsequently the bank received $1,105.28 and might have received much more than the amount of its guarantee, although in fact it allowed the McGhees to pay checks for $5,468 to the Kaiser Co., with the result that the Kaiser Co. still owes it some money. Therefore the bank is in a position of having realized the benefit to acquire which the guarantee was made, and of having realized it out of the proceeds of the goods that it induced the iron company to sell," said the Court.

The Case of the South Dakota Note

A South Dakota debtor gave Tractor Conn a note for contract work "done and performed." The note called for "interest at the rate of 6 percent per annum from date if paid when due; if not paid when due, at 8 percent from date."

"It isn't a note at all," the debtor contended two months later. "Until it falls due nobody knows whether it will be paid at maturity or not. If you don't know that, you don't know what rate of interest to charge. If you don't know the rate of interest you can't say it calls for 'a sum certain' and if it doesn't call for a sum certain it isn't a note."

"Whenever you pay the note, anyone with a stub pen and a common school education can figure up exactly what it will call for and that's all the law requires," Conn retorted.

"According to the weight of authority, neither a proviso that a note bearing no interest if paid at maturity shall bear interest from date if it is not so paid, nor a proviso that it is to bear a higher rate from date if not paid at maturity, or a lower than that therein specified if paid at maturity, renders it non-negotiable," said the South Dakota Court in deciding in favor of Conn, though there are some cases which take the opposite view.

The Case of the Busted Winch

"Ship No. 7 winch with bill of lading attached to a draft for the price," Tractor Conn wrote. The truck was wrecked in transit, the winch specified in the order was smashed beyond recognition, and the manufacturer demanded payment of the draft.

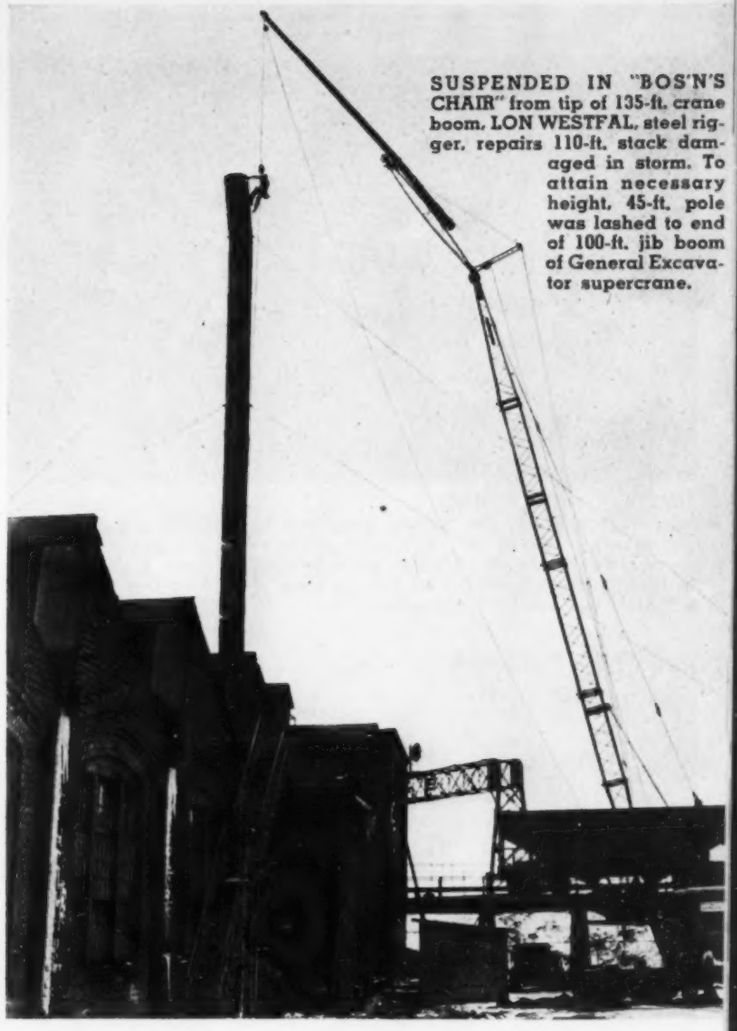
"I got no winch," Conn protested. "You took the bill of lading in your own name, and the shipment was yours till I got the bill of lading."

"No, it was yours as soon as I loaded it," the manufacturer contended. The parties went to court, the case came to trial, and the Supreme Court of South Carolina ruled in Tractor Conn's favor.

"Taking a bill of lading making the goods deliverable to the order of the seller, who is himself the consignor, is very strong evidence that the seller in delivering the goods to the carrier intended to reserve the title until payment of the purchase money. When a draft for the price is drawn on the purchaser with such bill of lading attached, the title does not ordinarily pass to him until the draft is paid," said the Court. The same rule has been laid down by the courts of Alabama, California, Georgia, Illinois, Iowa, Kentucky, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New York, North Carolina, Ohio, Pennsylvania, Tennessee and Virginia.

More Legal Adventures of Tractor Conn Next Month

JOB oddities

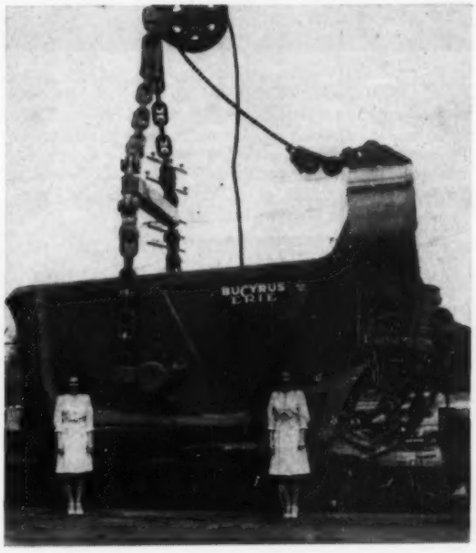


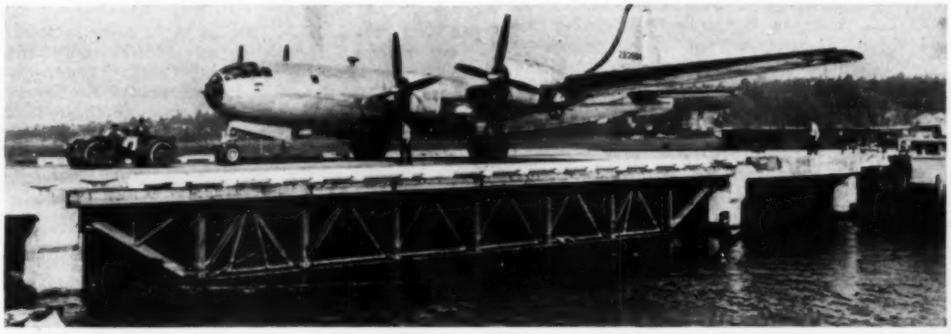
SUSPENDED IN "BOS'N'S CHAIR" from tip of 135-ft. crane boom, LON WESTFAL, steel rigger, repairs 110-ft. stack damaged in storm. To attain necessary height, 45-ft. pole was lashed to end of 100-ft. jib boom of General Excavator supercrane.

AMERICAN BULLDOZER pushes wrecked German tank off road in St. Marie en Chaux in southern France, as U. S. Combat Engineers clear way for advance of Allied Seventh Army.

British Combine Photo

HUGE 25-YD. DRAGLINE BUCKET (right) is built by Bucyrus-Erie Co. for use in stripping overburden in Pennsylvania anthracite fields. It is 13 ft. high from teeth to top of arch, 11 ft. 8 in. wide at maximum outside dimensions, and 17 ft. long from arch face to rear of bucket. Weight, 35 tons.





REMOVABLE BRIDGE carries B-29 Superfortress across river which separates Renton, Wash., plant of Boeing Aircraft Co. from airfield. Designed by The Austin Co., bridge is 85 ft. long and 110 ft. wide and is secured by removable locking pins to abutments at each end. It is mounted on 12 steel buoyancy tanks, each 5¼ ft. in diameter and 34 ft. long. Tanks are normally filled with water but in floating bridge aside to permit boat travel through waterway, they are made buoyant by forcing water out with compressed air.

AS MARINES LAND at Tarawa (right), this International diesel tractor plowing half submerged through high tide is first bulldozer to go ashore.

Present and Accounted For...A PAGE OF PERSONALITIES

NEW OFFICERS OF THE MOLES, New York organization of tunnel and heavy construction men, are (left to right): RALPH W. ATWATER, Shultz Dredging Corp., treasurer; WILLIAM W. HANLY, JR., Koppers Co., secretary; ALFRED N. WARWICK, Eugene F. Warwick, Inc., first vice-president; ARTHUR A. JOHNSON, Arthur A. Johnson Corp., president; and CHARLES B. SPENCER, Spencer, White & Prentis, Inc., second vice-president.

NEW PRESIDENT of American Society for Testing Materials is P. H. BATES, chief of clay and silicate products division, National Bureau of Standards.

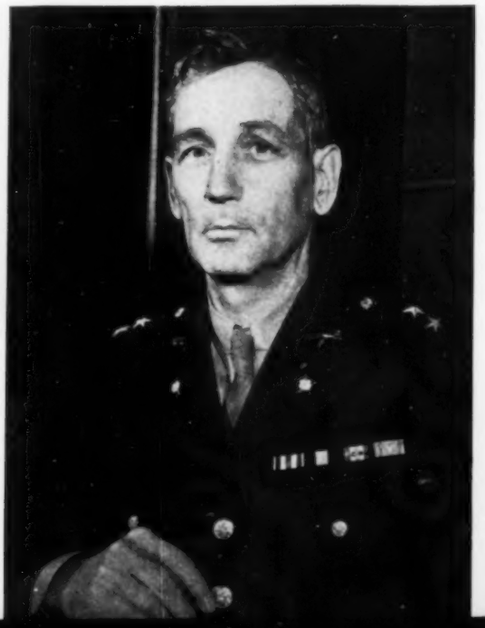
NEW FIELD SUBDIVISION set up by U. S. Bureau of Reclamation is directed by ERDMAN B. DEBLER, former director of bureau's Branch of Project Planning. Division includes most of Nebraska, eastern Colorado, southern Wyoming, western Kansas and part of southern South Dakota, with headquarters in Denver.

WESTERN SHIPBUILDERS (above) meet at Sausalito, Calif., shipyard of Marinship Corp. for launching of tanker, Mission Loreto. They are (left to right): K. K. BECHTEL, Marinship president; S. D. BECHTEL, chairman, California Shipbuilding Corp.; FELIX KAHN, vice-president, Joshua Hendy Iron Works; EDGAR KAISER, vice-president, Oregon Shipbuilding Corp.; and HENRY J. KAISER, president, Henry J. Kaiser Co.

LAKE FORMING behind Kentucky Dam is viewed by GEORGE P. JESSUP (below), project manager, who supervised its construction for Tennessee Valley Authority.

SUPPLY ORGANIZATION for U. S. Army in southern France is headed by MAJOR GENERAL THOMAS B. LARKIN (below), Corps of Engineers. Previously General Larkin commanded the Service of Supply, North African Theater of Operations. From 1933-37, he was in charge of construction of earth dam on Missouri River at Fort Peck, Mont.

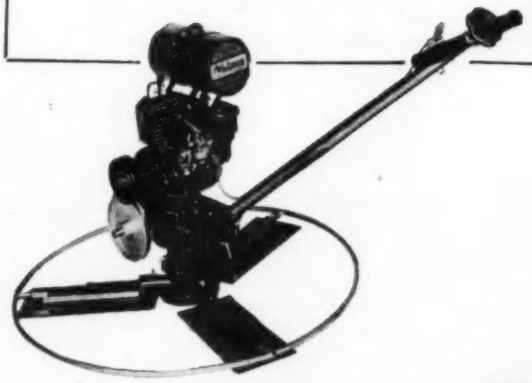
Signal Corps Photo



HIS FIRST TIME and he FINISHES 1,000 Sq. Ft. IN 15 MINUTES!

WITH THE New Revolutionary Lightweight WHITEMAN Concrete Floating – Finishing Machine

ESPECIALLY DESIGNED FOR THE SMALL CONTRACTOR



MODEL "J"

When a "green" hand can cover 1,000 sq. feet of concrete finishing in one quarter hour, think what an experienced operator will do!

Here's the economical, speedy way to use the BIG contractor's profitable MACHINE METHODS on the SMALL JOB.

Hundreds of "Model J's" are making good on small jobs today all over the country. Demand since introduction has developed rapidly and continues to increase. Weighs only 105 lbs. Easily carried. No "backbreaking" labor. Swell in congested spots . . . trowel only 34" in diameter. Its light weight means earlier starts on floating operations.

And the cost is LOW! The smallest contractor can afford one. Work faster, easier, with more PROFIT!

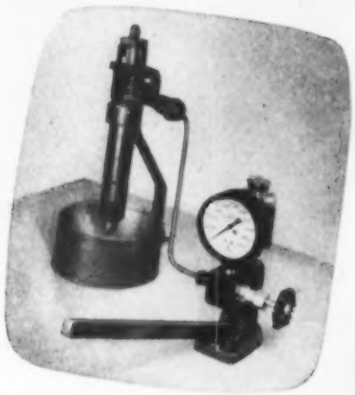
For details of Model J

Write or Wire for Name of Nearest Distributor

Whiteman MANUFACTURING CO

3249 Casitas Avenue Los Angeles 26, Californi

ADECO NOZZLE TESTER



KEEP DIESEL ENGINES RUNNING AT PEAK EFFICIENCY

With this sturdy, portable, light-weight Adeco Nozzle Tester, any mechanic can easily make quick, accurate tests on injector opening pressure, spray pattern, etc., and detect stuck needle valves and leakage around valve seats. Adeco advantages have made this America's most widely used nozzle tester. Tests both large and small injectors, on bench or engine. Avoids costly delays and possible damage to engine. Keeps diesels operating at peak efficiency.

Write for new illustrated bulletin.

ADECO
AIRCRAFT & DIESEL EQUIPMENT CORPORATION
4411 NORTH RAVENSWOOD AVENUE
CHICAGO 40, ILLINOIS

CONSTRUCTION EQUIPMENT NEWS

DECEMBER, 1944 REVIEW of Construction Machinery and Materials

NEW 12-IN. HYDRAULIC DREDGE for use of U. S. Army Engineer Corps is completely integrated diesel-powered unit of compact design fully equipped to operate in isolated locations for long periods. It requires no supply service except for fuel and lube oils and sustenance for personnel. It is designed to handle sand, clay and silt to a depth of 16 ft. and deliver material through a maximum of 1,000 ft. of discharge line at water level or 500 ft. of discharge line at 30-ft. elevation. General specifications call for main dredging pump with a 14-in. suction and 12-in. discharge pipe, powered by an 8-cylinder, 320-hp. diesel engine; a main power plant of an 85-kw. diesel-electric generator set, and an auxiliary diesel power plant of 6 kw. The 104x29x6-ft. steel hull prefabricated for assembly by bolting, enables the complete dredge to be shipped on standard railroad cars and as hold cargo to overseas destinations. No fabrication is necessary at the site of erection. Prefabricated steel plates and all other panels and sections join easily and when last bolt is in, hulls are completely watertight. When the dredge has served its purpose in one location, it is possible to dismantle it and ship it to another site. Dredge has a 36-ft. digging ladder fitted with interchangeable cutter heads. Unit is equipped with 5-drum hoist which enables extremely high rope pull at low speeds due to special compound gearing. Cone friction clutches are used and a drum switch controlling hoist assures flexible operation.—**The American Steel Dredge Co., Fort Wayne, Ind.**

★ ★ ★

FLAME PRIMING AND DESCALING NOZZLES, for attachment to any Victor welding torch butt and used to remove rust scales from steel plate and prepare it for painting, are available in 4- and 6-in. widths. Advantages: (1) Provided with spiral mixer and gas proportioner designed to handle large gas volumes required in these operations; (2) mixing device said to assure freedom from backfire or flashback; (3) Airadiator aluminum cooling section incorporated at nozzle head keeps premixed gases below ignition temperatures, even within proximity of ribbon flame and deflected heat; (4) replaceable Meehanite skid shoes add substantially to wearing life of nozzle and permit it to be spotted at any suitable angle over metal surfaces to be cleaned.—**Victor Equipment Co., 844-54 Folsom St., San Francisco, Calif.**

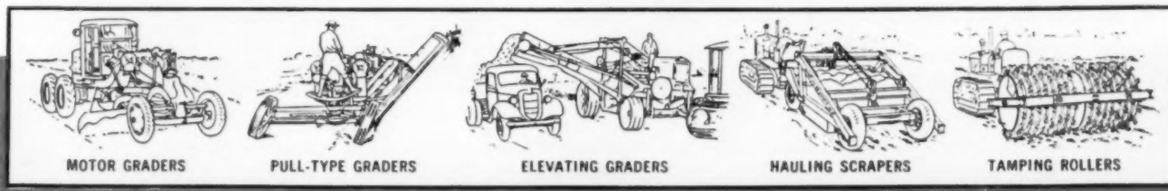
THEY'LL SOON BE BACK *in "Civies"...*

For some three years practically every machine leaving the Adams shipping dock has been dressed in the war paint of the Army or Navy. Hundreds of Adams motor graders, leaning wheel graders, elevating graders—including specially designed pull-type graders and tamping rollers for the airborne engineers—have been shipped to all parts of the world. Reports from all sources indicate that they are doing a grand job in the building and reconstruction of air bases, landing strips, roads, etc.

In the very near future—in time for spring work—Adams equipment should again be available for delivery for civilian uses subject, of course, to whatever government restrictions are in effect at that time. In connection with your 1945 planning see your local Adams dealer now about the machines you need. He's alive to the possibilities and can be of real service to you.

J. D. ADAMS COMPANY · INDIANAPOLIS, IND.

At war's end we'll need many new roads and many jobs for returning service men. Plan post war projects now and meet both needs.



ADAMS ☆ ROAD-BUILDING AND EARTH-MOVING EQUIPMENT ☆

What's the "Life Expectancy" OF GENERAL EXCAVATORS?

Frankly, we don't know. Here's why: OF ALL THE GENERAL MACHINES EVER BUILT (over 18-year period) MORE THAN 98% ARE STILL IN SERVICE

And that isn't all! The 2% mortality includes machines unaccounted for by our records (machines we've lost track of since they left the hands of the original owners). Many of them undoubtedly are "working" and thus, *practically every General built during the past 18 years is on the job today!*

If you own a General Supercrane or Excavator, you know from experience the stamina and all-job dependability of these versatile, powerful rigs. And if you're planning now for the purchase of postwar equipment, it will pay you to get the facts on the *complete General line* including the new and revolutionary . . .

GENERAL TYPE 10

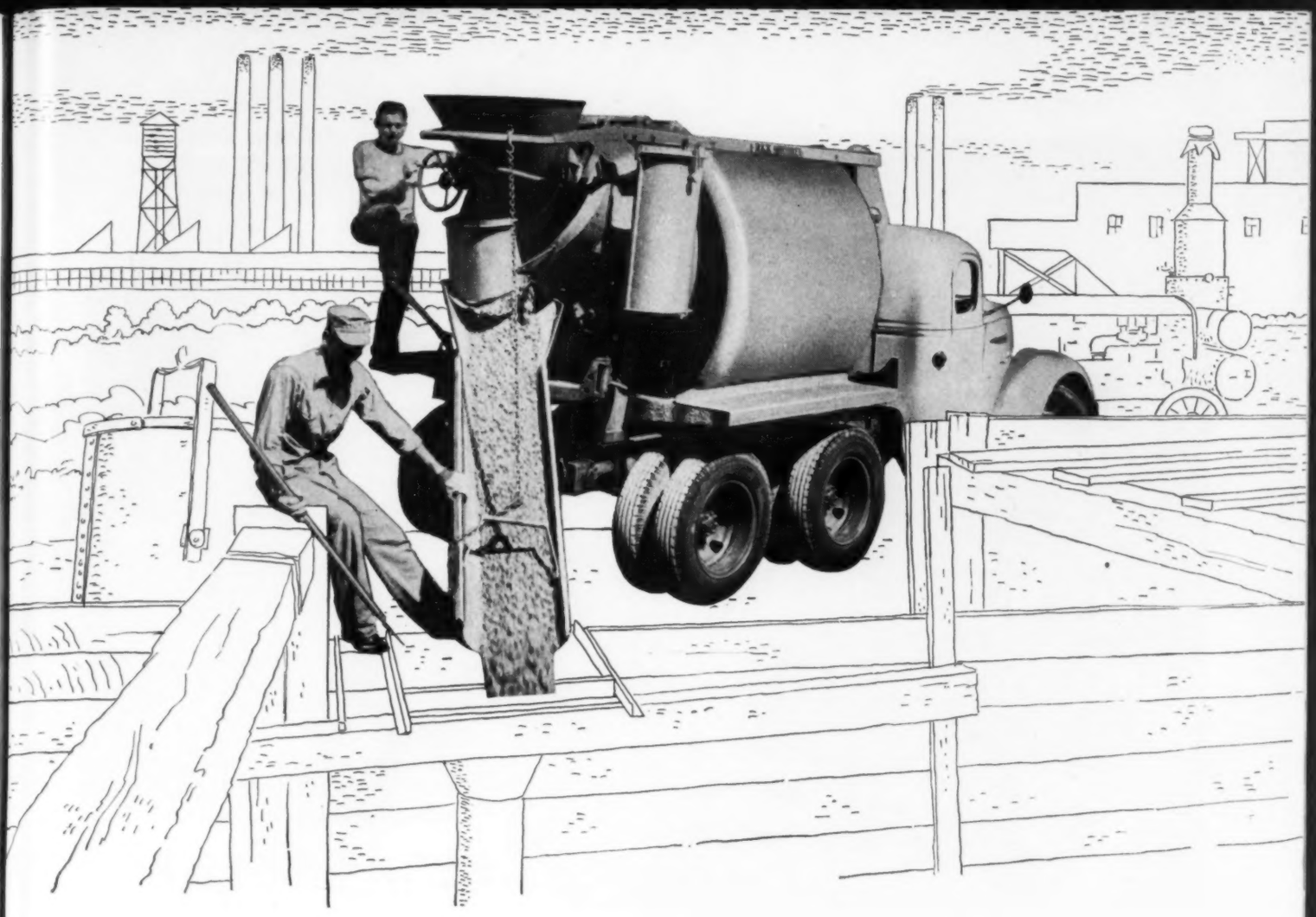
Mobile, compact combination crane-shovel-dragline One-man, one-engine operated . . . and on rubber!

THE OSGOOD COMPANY
SHOVELS, DRAGLINES
CRANES
CRAWLER & WHEEL MOUNTS
DIESEL, OIL, GAS, ELECTRIC

Associated with The Osgood Company

GENERAL EXCAVATOR CO.
CRANES-SHOVELS MARION OHIO U.S.A. GENERAL OSGOOD
MARION, OHIO

GENERAL
CRANES, DRAGLINES AND SHOVELS
DIESEL, GAS, ELECTRIC



It's *"Cushioned"* to cut maintenance costs!

YOU can forget about the dangers of road shocks—of weaving and sidesway—the strains of quick starts and stops with a fully loaded drum—*if* your truck mixer is a Rex.

For the drum of a Rex Moto-Mixer rides on a cushion . . . the exclusive chain belt drive that absorbs all shocks and stresses. There are no unyielding gears and pinions to transmit damaging shocks directly to the costly transmission and power plant.

Many Moto-Mixer owners say this one feature alone is enough to make Rex their choice . . . that their maintenance costs are practically limited to greasing and cleaning.

And there are other advantages you get with Rex and Rex only. You get 100% accurate water system; 5-in-1 Quint Spout; the exclusive Rex Hi-Lo Mixing action; the Rex end-charging hopper; revolutionary visible mixing; Rex unrestricted discharge; and many others.

• • •

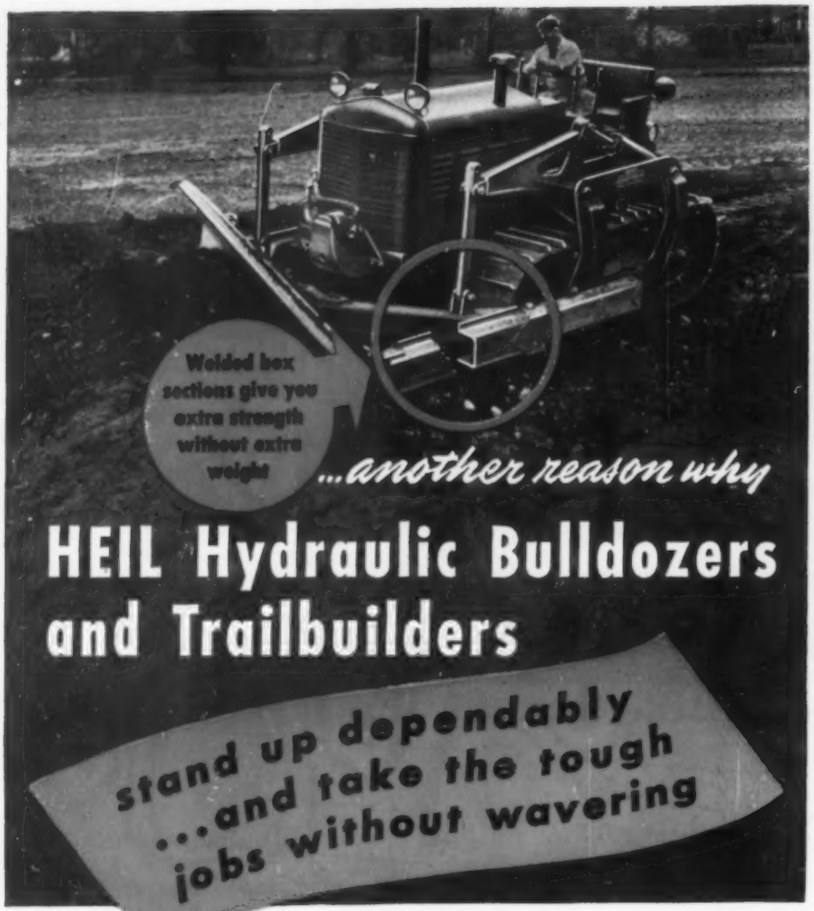
FOR INFORMATION on Rex Moto-Mixers, send for your copy of Bulletin No. 405. And check the other Rex construction equipment: Mixers, to cut concrete placing costs; Pavers, that can give you really heavy yardage production, faster; Pumpcretes, that pump concrete by pipeline . . . Pumps, that move water economically and efficiently. See your Rex Distributor, or write direct to Chain Belt Company, 1664 West Bruce Street, Milwaukee 4, Wisconsin.

CHAIN BELT COMPANY *of Milwaukee*

REX

CONSTRUCTION MACHINERY

PUMPS PAVERS PUMPCRETES MOTO-MIXERS MIXERS


Welded box sections give you extra strength without extra weight
...another reason why
HEIL Hydraulic Bulldozers and Trailbuilders
stand up dependably ...and take the tough jobs without wavering

Heil engineers and fabricators have pioneered the modern practice of replacing heavy members with welded box sections that are lighter, stronger, and easy to repair in the field without costly delays. The advanced design of Heil equipment assures you of more speed . . . greater flexibility . . . and ability to push through when the going is tough. Because they're tailormade to Cletrac Tractors, you get full visibility for safe, efficient handling.

The Trailbuilder blade is easily angled to right or left for side-casting new cuts. Bulldozer blade takes rocks and stumps without changing pace.

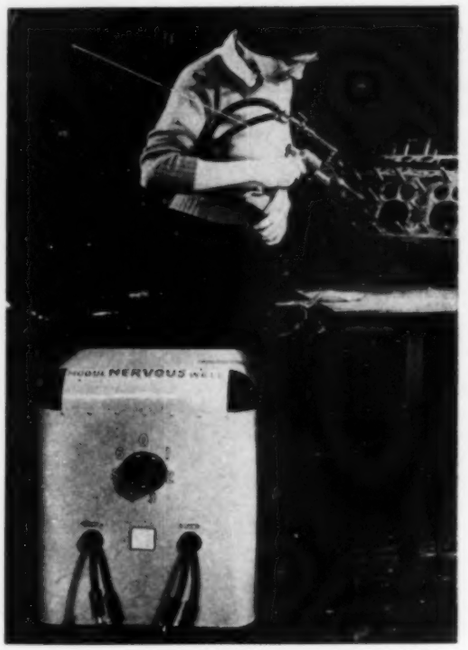
The Heil hydraulic system comes close to a perfect leak-proof unit—stays in adjustment and gives a minimum of trouble.

For full loads and more yardage per day and per year — at lower cost — use Heil Earth-moving equipment.

Write for bulletins.

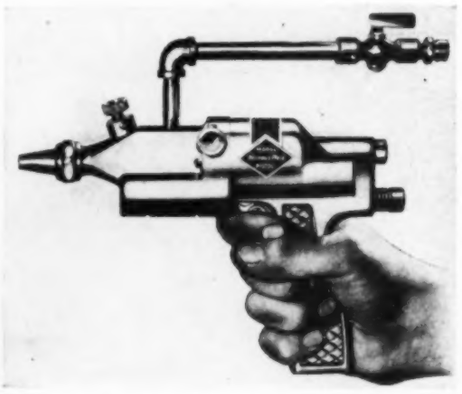
R-24

NEW METALLIZING PROCESS, utilizing Mogul Nervous Weld pistol and machine designed primarily for repairing castings, is of interest to the construction field for use in such work as building up surfaces for press fits, repairing cracked housings,



MACHINE, 110-440-v., 60-cycle, single phase unit, supplies pistol with 60 lb. of air pressure at 4 to 5 cu. ft. per min.

motor blocks, pump housings and preparing surfaces for metallizing. Pistol requires 60-lb. air pressure at 4 to 5 cu. ft. per min. Machine is 110, 220, 440 v., 60 or 25 cycle, single phase unit equipped with two 10-ft. lengths of cable, male and female receptacle, pair of goggles, heavy-duty ground clamp, 20-ft. length of air hose complete



PISTOL has finger-grip trigger which feeds 1/8 to 3/4 in. of aluminum bronze or nickel rod with each stroke.

with fittings, wall receptacle and complete instructions. Pistol deposits atomized particles of metal which are welded to surface and pressed leaving metal which is welded and forged. Designed for manual operation, aluminum, bronze or nickel rod is fed in 1/8- to 3/8-in. sections through pistol with one stroke of finger-grip trigger. Advantages: eliminates stresses and distortion in repair of de-

OUTSPEEDING DEATH

Prompt removal by air to base hospitals is just one reason why the mortality rate among our seriously wounded in this war is only half that of World War I. Over mountains and deserts, over routes that vary from a few miles to hundreds, our winged ambulances carry their precious loads. Until the last wounded man has been brought to the source of the best possible care, they fly on, stopping only to load and unload.

American Bosch aviation equipment contributes importantly to the stamina of American planes in every task of battle and transport. Aviation magnetos carry on from sea level to 7 miles up — in air temperatures that vary from +150° to −70°, in a matter of minutes.

Starting vibrators get planes off the ground faster. And gasoline fuel injection equipment adds another notch to American plane superiority.

Over a world battlefront today, and around a shrunken globe tomorrow, American Bosch research, engineering counsel, production and maintenance facilities will continue to serve all branches of the internal combustion industry.

AMERICAN BOSCH CORPORATION • SPRINGFIELD, MASSACHUSETTS

AMERICAN BOSCH

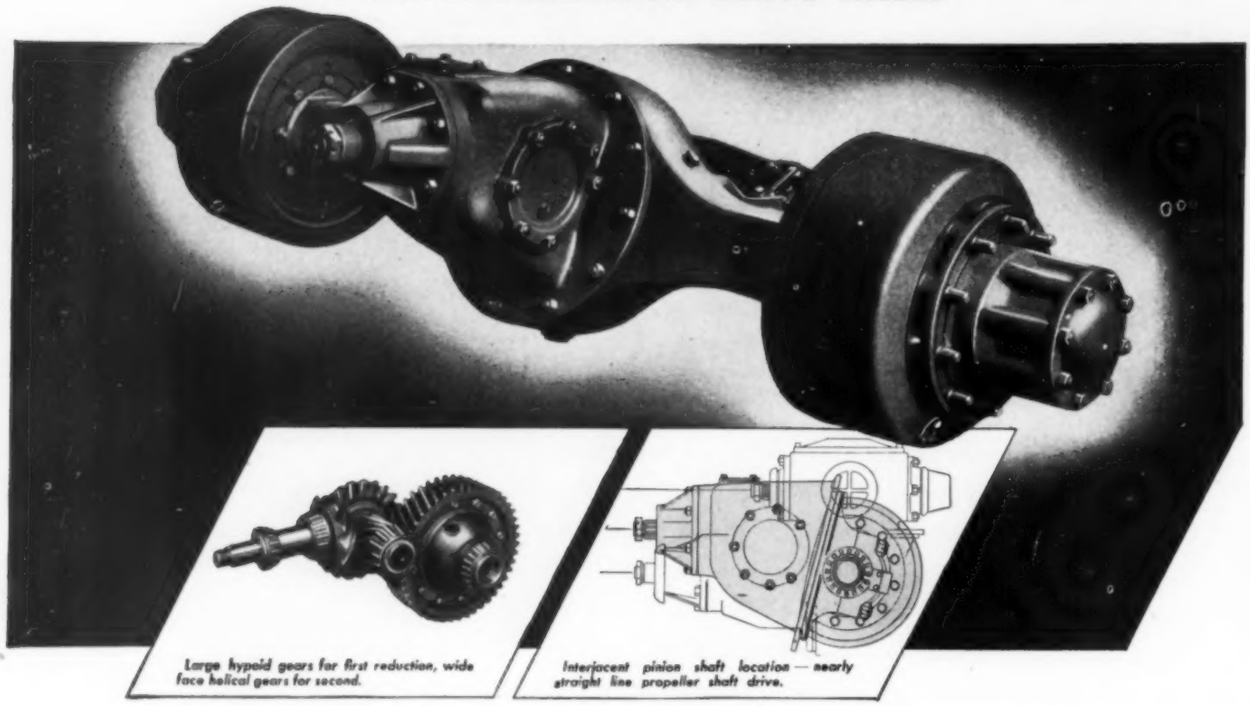
AVIATION AND AUTOMOTIVE ELECTRICAL PRODUCTS • FUEL INJECTION EQUIPMENT

For Tough Hauling Jobs

USE THE NEW TIMKEN

S-200-P and U-200-P

DOUBLE REDUCTION DRIVE AXLES



Large hypoid gears for first reduction, wide face helical gears for second.

Interjacent pinion shaft location — nearly straight line propeller shaft drive.

ARMY E NAVY
"Well Done"

Timken-engineered throughout, these great new axles combine all the time-tested Timken features with many important new improvements. . . . S-200-P is intended for heavy duty hauling on highways and city streets where permissible loads are over 18,000 pounds per axle, at tires on ground. Torque capacity is ample for modern high-power engines. . . . U-200-P is for off-the-highway operations, using the same engine torque but where still greater load-carrying capacity is required. . . . Write for descriptive literature — ask for a Timken Axle Engineer to work with you in solving your axle and brake problems.

38 YEARS OF AXLE ENGINEERING LEADERSHIP

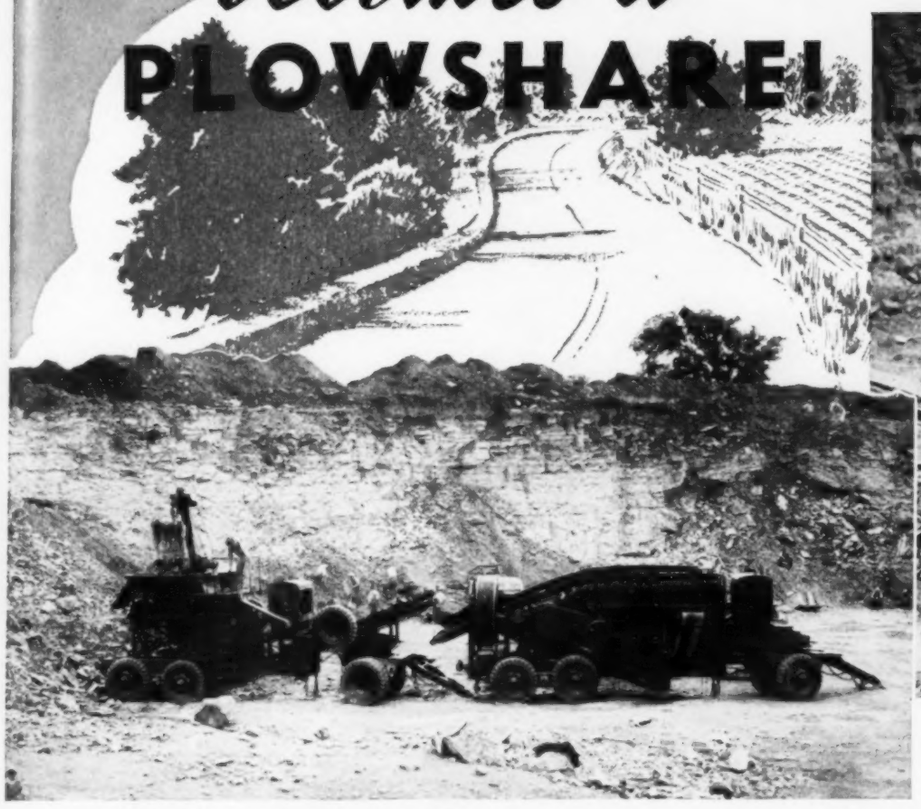
TIMKEN AXLES

THE TIMKEN-DETROIT AXLE COMPANY, DETROIT 32, MICHIGAN

WISCONSIN AXLE DIVISION · OSHKOSH, WISCONSIN

AMERICA IS *Built with Aggregate!*

Another SWORD *becomes a* PLOWSHARE!



This Cedarapids mobile plant was on duty in a French quarry five days after D-day. Signal Corps Photo

Designed for military service, this type of Cedarapids crushing and screening plant will easily handle your toughest aggregate producing problems.

Cedarapids

Built by IOWA

THE IOWA LINE

of Material Handling Equipment Includes

ROCK AND GRAVEL CRUSHERS
BELT CONVEYORS—STEEL BINS
BUCKET ELEVATORS
VIBRATOR AND REVOLVING SCREENS
STRAIGHT LINE ROCK AND GRAVEL PLANTS
FEEDERS — TRAPS
PORTABLE POWER CONVEYORS
PORTABLE STONE PLANTS
PORTABLE GRAVEL PLANTS
REDUCTION CRUSHERS
BATCH TYPE ASPHALT PLANTS
TRAVELING (ROAD MIX) PLANTS
DRAG SCRAPER TANKS
WASHING PLANTS
TRACTOR-CRUSHER PLANTS
STEEL TRUCKS AND TRAILERS
KUBIT IMPACT BREAKERS

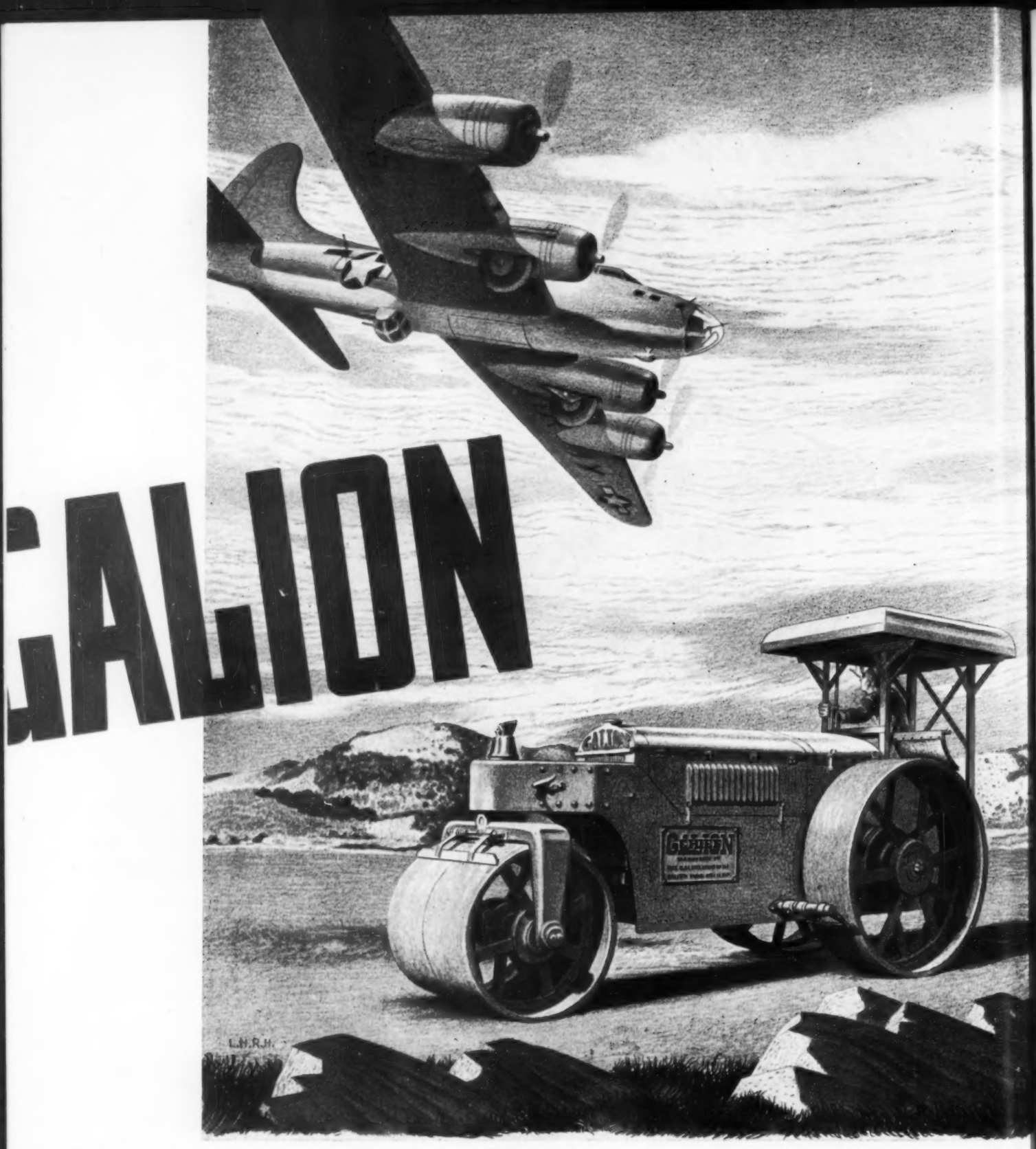
From building military airports and highways that are vital to victory to producing aggregates for peacetime airports, highways, dams, and other construction projects, is the next step for these Cedarapids portable crushing plants.

We're still building them for the Army and Navy but soon all the experience and facilities which produced these plants on schedule can be turned almost entirely to building them for you. They will turn out better products for less money, keeping you in that wonderful competitive position that you have always had with Cedarapids equipment.

Whether you are figuring on a single unit or a complete plant, you'll be way ahead if you get it from Iowa, headquarters for aggregate producing and crushing equipment, and asphalt plants. See your local Iowa dealer today.

IOWA MANUFACTURING COMPANY
CEDAR RAPIDS, IOWA

ARMY NAVY



HOW SMOOTH WAS MY TAKE-OFF?" — "How Smooth was my Landing?"

That depends, Mr. Pilot, a great deal upon the condition of the airfield. Smooth it was if Galion Rollers had been there *first*. These versatile units, like our pilots, provide *top* performance both here and over there — they can 'level off' with as much ease as you maneuver your plane. They are essential, too, in modern, mechanized warfare.

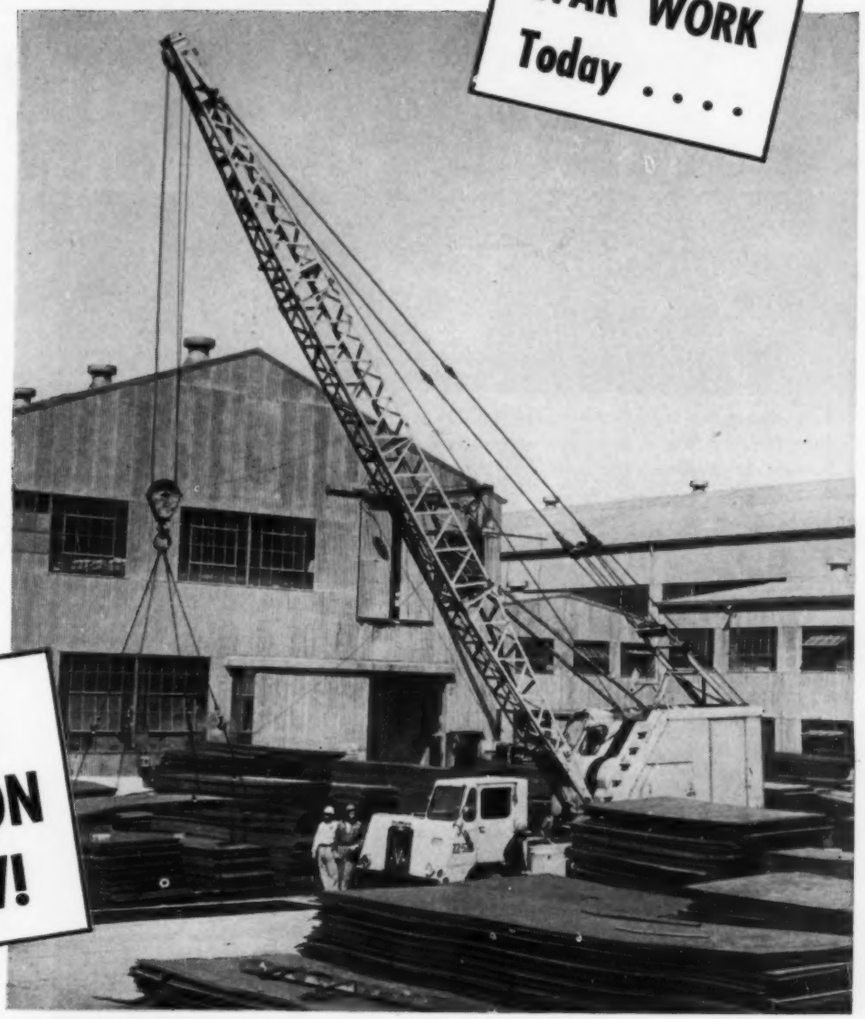
GALION ROAD MACHINERY

THE GALION IRON WORKS & MFG. CO.

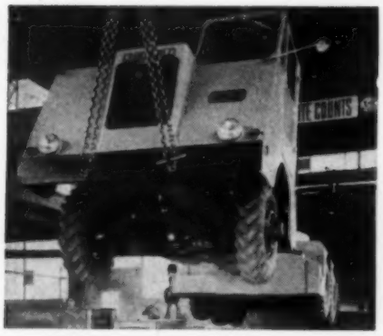
***Main Office and Works:* GALION, OHIO**

MOTION GRADERS • ROAD ROLLERS • SPREADERS

WAR WORK Today . . . .



PEACE TIME CONSTRUCTION TOMORROW!



One of two types of carrier for the CraneMobile is this extra heavy-duty 6x6 unit with driving power on all six wheels. The front drive axle may be engaged or disengaged as required by declutching mechanism in the power transfer case by lever conveniently located in cab.

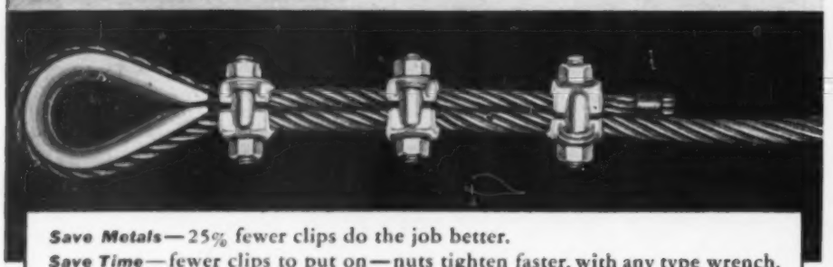
Tomorrow, when material handling such as this is again "peacetime" work you can rely on the dependable performance which has made this BAY CITY CraneMobile so popular. Here is a pneumatic tire mounted crane on a specially designed carrier that offers rugged construction, simplified design and ease of operation. Right now all production of these flexible mobile machines is going to the Armed Services but some day—*and we hope soon*—they will again be available for Civilian use. The CraneMobile, made in 5 to 20 ton capacities, offers a complete unit which is designed and engineered for the most exacting lifting requirements of general contractors, steel erectors, public utilities, mining companies, industrial plants and others. You will want to become better acquainted with the CraneMobile so why not write BAY CITY SHOVELS, INC., BAY CITY, MICHIGAN for a copy of catalog 18C.

BAY CITY SHOVELS 12 Sizes ⅝ to 1½ Yard Also truck mounted shovels and cranes

BAY CITY

SHOVELS • CRANES • DRAGLINES • TRENCH-HOES • SKIMMERS

THESE
SAFETY "FIST-GRIP" CLIPS
SAVE METALS • SAVE TIME
PREVENT ACCIDENTS



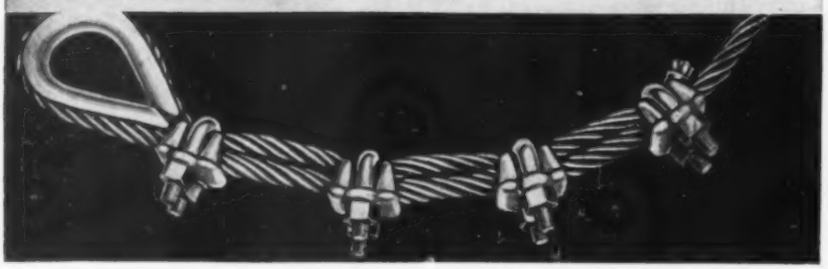
Save Metals—25% fewer clips do the job better.
Save Time—fewer clips to put on—nuts tighten faster, with any type wrench.
Prevent Accidents—can't be put on backwards.

THESE "FINGER-PINCH" CLIPS WASTE METALS

More clips required. Pinch and distort rope. Protruding bolts easily damaged.

WASTE TIME

Must be applied with saddles on load end of rope. Can't be tightened unless proper wrench is handy.



SAVE MEN, MATERIALS, AND TIME WITH

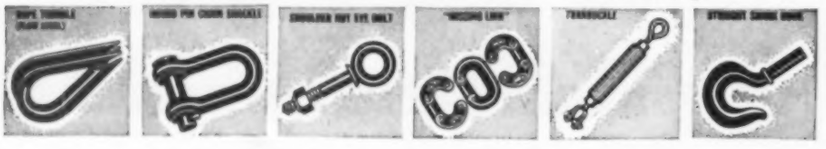
LAUGHLIN "FIST-GRIP" CLIPS

Laughlin's complete line of wire rope and chain fittings is distributed through Mill, Mine and Oil Field Supply Houses

FORGING A SHARE IN VICTORY

THE THOMAS LAUGHLIN *Company*
PORTLAND 6, MAINE

Look for Laughlin Products in Powers Road & Street Catalog.



fective aluminum castings. Temperature does not rise above 125 deg. and yet provides a deposit so dense at point of fusion that there is no apparent line of demarcation. Operating features: power chamber and peening motor, air-cooled nozzle, which keeps cooled both electrode and work, finger trigger which permits manual wire feed, needle valve to regulate air supply and electrode lug-connector.—**Metallizing Co. of America, 1330 West Congress St., Chicago 7, Ill.**

★ ★ ★

ORGANIC CEMENT, labelled Pliobond, is claimed by its manufacturers to have numerous unusual uses because of its ability to bond natural and synthetic rubber to metal, glass and ceramics; wood and plastics to metal; canvas to plastic; rubber to leather; paper to leather; canvas and other fabrics to metal, and felt to cardboard. Because it can be used with materials where tough, flexible bond is required which is waterproof and resistant to common solvents, it is recommended as a possibility for the following sealing jobs: (1) Pipe-thread sealing compound; (2) sealing joints of motors' metal cases to prevent gasoline or other fluids from seeping in; (3) bonding synthetic rubber to metal in warplane carburetors; (4) in production of submarine cables; (5) attaching sheet rubber to vitrified abrasive wheels for elimination of vibration and noise; (6) cabinets, doors and shipping boxes with wood sealed to metal; (7) hollow metal cylinders bonded with thin layer of "marbelized" plastic for strong and decorative pillars.—**Goodyear Tire & Rubber Co., Akron, Ohio.**

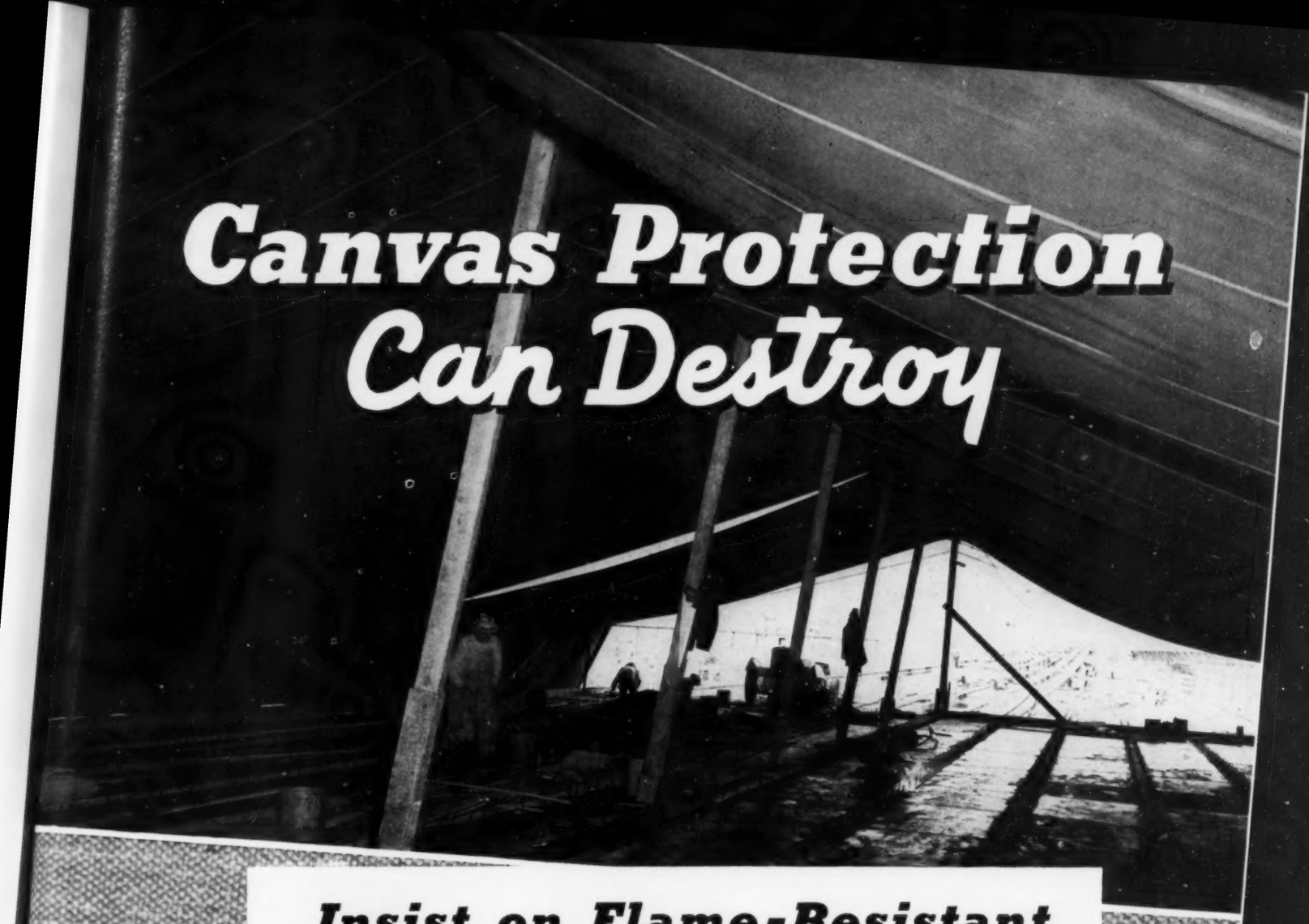
When the Axis Surrenders

You'll find new and improved BYERS Draglines and Shovels available to go on your job.

In the meantime, owners of current and older models of Byers shovels and cranes may depend on Byers Parts Service to help them keep present equipment working steadily and satisfactorily.

BYERS CRANES AND SHOVELS
RAVENNA, OHIO
DISTRIBUTORS THROUGHOUT THE WORLD

Canvas Protection Can Destroy



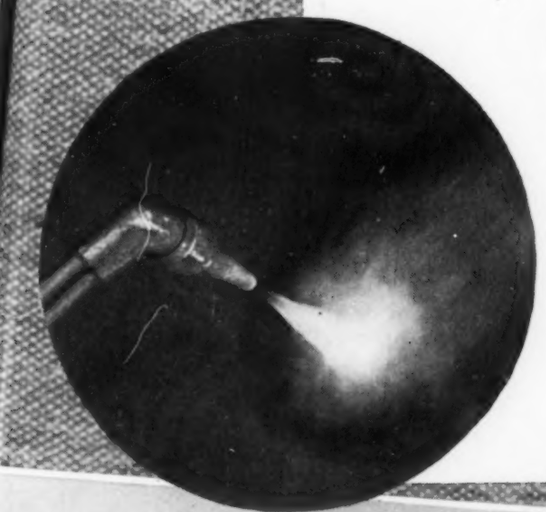
Insist on Flame-Resistant Fire Chief Finished Canvas

The one way to be *certain* your windbreaks, tarpaulins and welding curtains aren't potential fire hazards is to use FIRE CHIEF-treated Canvas — the original fire-, water-, weather- and mildew-resistant HOOPERWOOD "Engineered Canvas."

FIRE CHIEF *will not* support combustion . . . it cannot burst into flame like ordinary canvas. Proof of this is shown in the unretouched photo at the left. Even flame from a welding torch cannot ignite it. FIRE CHIEF lasts longer because it resists the elements of deterioration, sun, rain, mildew, fire and all the rest. This has permitted the Army, for instance, to use a lighter-weight duck than formerly was necessary. FIRE CHIEF is more economical over a period of time.

Many useful and informative facts about Hooper Canvas Engineering have been incorporated into a new bulletin, "War-Proved for Post-War Service." Write for a copy.

WM. E. HOOPER & SONS CO.
New York **PHILADELPHIA** Chicago
Mills: WOODBERRY, BALTIMORE, MD.



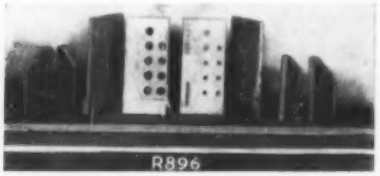
• Fire-Chief Finished (PATENTED) •

HOOPERWOOD COTTON DUCK

Keeping the "Cat's" Claws *In There Scratching . . . .*

One of the harshest tests of the wearing properties of metal parts was encountered in the systematic recovery of many thousand tons of steel scrap from steel plant furnace slag by The Heckett Corporation of Butler, Pennsylvania.

The working parts of the equipment for a Heckett operation



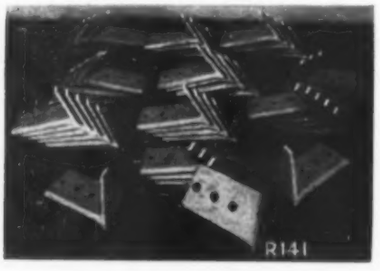
which are exposed to the slag are subjected to possibly the severest wearing action of any equipment used in industry. The slag is extremely abrasive, and only austenitic manganese steel equipment wearing parts can stand up long under the grinding, battering service. Applications of Amsco manganese steel in this equipment include dippers, crawler treads, cutting edges for the "cat" bulldozers, lifting magnet cover plates and shells and housing lips for the magnetic separators.

The Amsco manganese steel cutting edges (picture R-896) applied to the bulldozer blades are taking the hardest wear and stress in the whole process and are giving eight to ten times the life of heat-treated alloy steel edges. The manganese steel pieces cost only about two and a quarter times as much as the ordinary, so the saving is great in metal cost alone, without considering the labor and operating time saved in avoiding frequent replacements.

Picture R-141 shows corner bits for bulldozers used in road-building; parts likewise subjected to severe wear.

Picture C-388 shows one of several types of scarifier teeth to which the toughness and abrasion resistance of manganese steel give an unsurpassed service life at an economical cost.

Send for Bulletin 1143-CI.

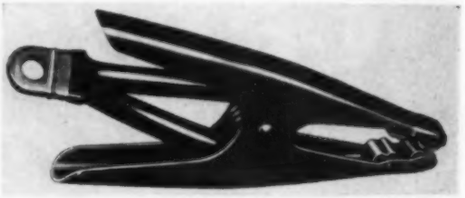


Send for Bulletin 941-W on Amsco Conservation Welding Rods.

Amsco
AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Illinois
FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
OFFICES IN PRINCIPAL CITIES

AMERICAN Brake Shoe COMPANY

GROUND CLAMP for welders is designed so that each jaw connects independently to ground cable. Thus, if one jaw is prevented from making a good electric contact because of heavy scale or



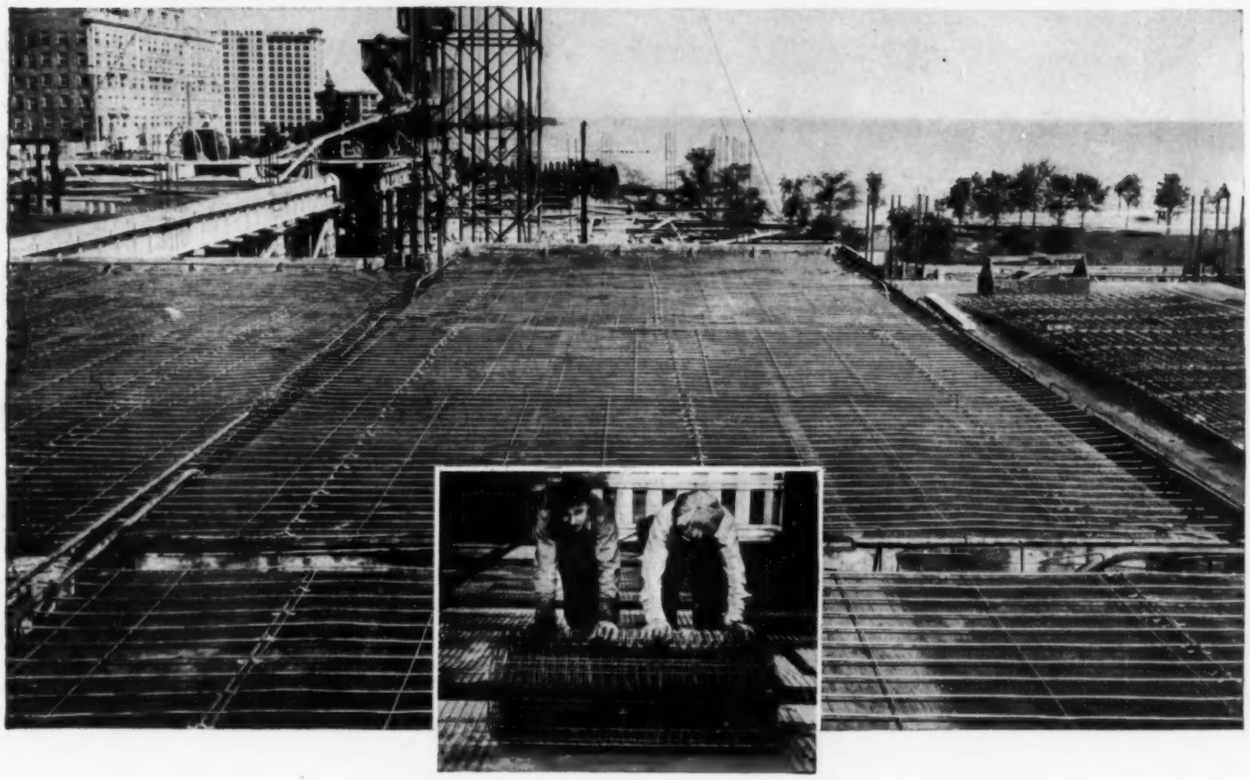
paint, other jaw will carry current. Tool has heavy-duty processed steel frame with durable copper conductors and contacts. Weight, 1½ lb. Maximum jaw spread, 2½ in. Rating, 300 amp.—**Lincoln Electric Co., 12818 Coit Road, Cleveland 1, Ohio.**

★ ★ ★

LIQUID RESIN GLUE which sets at room temperature and is used with separate dry powder catalyst, is recommended for work where complete durability is required and where joints cannot be heated, such as gluing of thick laminations for heavy-duty built-up arches and beams. Advantages: (1) long storage life—may be stored indefinitely at room temperature; (2) bonds at low pressures and on uneven surfaces; (3) sets at 70 deg. F. or warmer and cures in 8 to 10 hr. at 70 deg. F. or less at warmer temperatures; (4) boil-proof, moldproof, durable.—**Casein Co. of America, 350 Madison Ave., New York 17, N. Y.**

Light enough to handle . . heavy enough to "take it". These HIGHLY PORTABLE CMC's have proven their durability and sturdiness on important jobs all over the world. They are "first choice" Mixers in peace or war. All standard sizes. Get information.

CONSTRUCTION MACHINERY CO.
Waterloo, Iowa
Mixers • Pumps • Hoists • Batching & Placing Equipment • Saws • Carts • Barrows



For all concrete construction

. . . WIRE FABRIC REINFORCEMENT

MILLIONS of square feet of American Welded Wire Fabric have been used as reinforcement in prominent buildings all over the country. Because its adaptability to countless uses in concrete construction has been proved conclusively, because it is so practical, so convenient, so economical, it has won wide acceptance among architects and engineers.

Wire fabric is the preferred reinforcement because it enables the concrete slab to withstand impact, stresses and strains in every direction. Made of high yield-point cold-drawn steel, American Welded Wire Fabric is convenient to handle, is installed quickly and easily, lies flat and always stays in place. Think what those advantages mean in savings of construction time and costs.

We shall be glad to consult with you on reinforcement problems and to send you detailed information on the many and varied uses of American Welded Wire Fabric. Drop us a line today, without obligation.

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

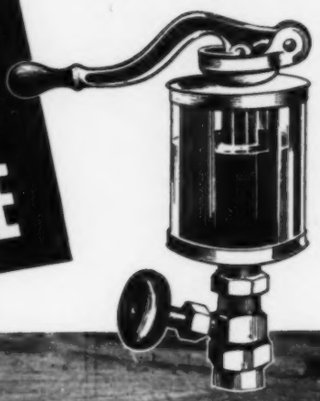
Columbia Steel Company, San Francisco, *Pacific Coast Distributors*

United States Steel Export Company, New York

AMERICAN WELDED WIRE FABRIC

UNITED STATES STEEL

BETTER LUBRICATION *means* BETTER MAINTENANCE



IF you are experiencing difficult maintenance, better check lubrication. It may be inadequate with resultant excessive wear.

Sinclair offers better lubrication for better maintenance. SINCLAIR PENNSYLVANIA and OPALINE MOTOR OILS give safe lubrication in the hard grind of full load operation. TEN-OL 200 efficiently lubricates Diesel-powered equipment.

• • •

(Write for "The Service Factor"—published periodically and devoted to the solution of lubricating problems.)

SINCLAIR LUBRICANTS-FUELS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

P&H truck cranes

EAST SIDE, WEST SIDE,

ALL AROUND THE TOWN!

The ability of the new P&H Truck Crane to get around town—or all over the county—enables you to get many jobs done before other equipment can get there. And the ability to perform a wide variety of tasks in handling materials, loading or unloading, erecting structural steels, placing concrete, etc., means you can keep them busy more days of the year—working with hook, clamshell, magnet, or dragline bucket.

P&H TRUCK CRANES OFFER YOU

- New improved design.
- Low center of gravity with maximum stability to handle a wider range of work.
- Weave-proof box-section frame—no boom point sway.
- P&H hydraulic control with planetary lowering mechanism for greater placing or handling ease and accuracy.

P&H Truck Cranes are speeding many vital war-time projects, saving time, manpower, and money. Ask for information.

General Offices:

4494 W. National Ave., Milwaukee 14, Wisconsin

P&H

Overhead Cranes • Electric Hoists
Excavators • Welding Positioners
Arc Welders • Welding Electrodes

Milwaukee 14, Wisconsin

HARNISCHFEGER CORPORATION

EXCAVATORS • ELECTRIC CRANES • ARC WELDERS • HOISTS • WELDING ELECTRODES • MOTORS

DUFF-NORTON JACKS

BUILT TOUGH AND HUSKY FOR HEAVY DUTY ON EVERY CONSTRUCTION JOB!

Your construction equipment must be strong, tough and husky . . . it must be able to take long, hard service. That's why Duff-Norton Jacks are ideal for every construction job. They're powerfully built to give you fast, easy action under all conditions . . . And the Duff-Norton Jacks you buy now for use in war-time construction will still be giving you good service in the peacetime years to come. Specify Duff-Nortons for all your work!

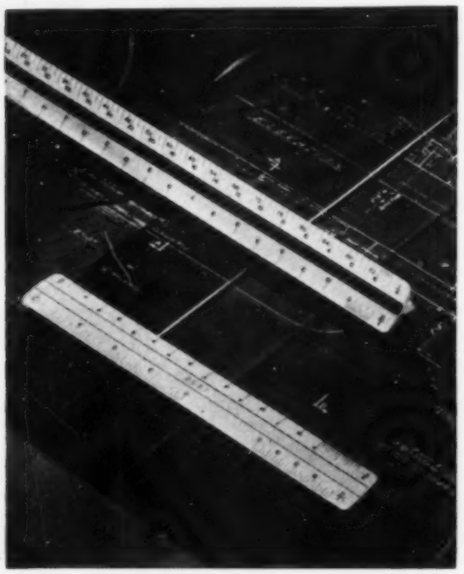
Write for Catalog 202 . . . gives you complete application data, descriptions and specifications of the entire Duff-Norton line. Norton line.

THE DUFF-NORTON MANUFACTURING COMPANY
PITTSBURGH, PA.

Canadian Plant: COATICOOK, QUE.

Representatives in Principal Cities

SLIDE RULE COMPUTOR for bituminous mixes to enable paving engineers and contractors to calculate easily and quickly tonnage needed for any job is designed to accommodate any variation in



density of mix from most open cold mix to densest hot mix, any length, width or thickness desired from driveways to airport runways. Model with celluloid face is obtainable at $3.00; plain wooden model will be available shortly at $2.00.—**Kotal Co., 52 Vanderbilt Ave., New York 17, N. Y.**

Streamlined ***INSIDE*** for Higher Efficiency and Lower Operating Costs

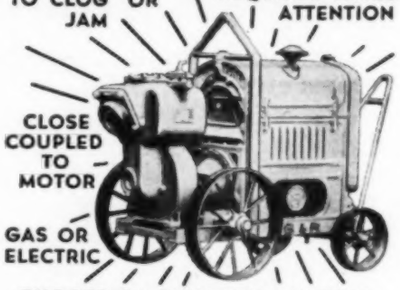
NO ORIFICE OR PRIMING VALVES TO CLOG OR JAM

HOLDS PRIME

REQUIRES LITTLE ATTENTION

CLOSE COUPLED TO MOTOR

GAS OR ELECTRIC



RUGGED SIMPLICITY OF DESIGN ELIMINATES RECIRCULATION—

DELIVERS GREATER VOLUME PER GAL. OF GAS

CAPACITIES UP TO 125,000 GPH

The GORMAN-RUPP CO. Mansfield, Ohio

GORMAN-RUPP
Self-Priming Centrifugal Pumps

How to save time and money

on winter construction jobs

Use Lehigh Early Strength Cement in your concrete. There are good, practical reasons why it pays to do this . . .

1 Lehigh Early Strength means 60 to 70% saving on heat curing costs.

2 Less danger of damage from freezing.

3 Permits quicker form removal at lower cost.

4 Helps bring the whole job to quicker completion.

That's because Lehigh Early Strength Cement cures and reaches service strength *three to five ti nes faster than normal cement.*

The Lehigh Service Department will gladly answer your questions on winter construction. Send for our bulletin on Concreting in Cold Weather.

Lehigh CEMENT

LEHIGH PORTLAND CEMENT COMPANY · ALLENTOWN, PA. · CHICAGO, ILL. · SPOKANE, WASH.

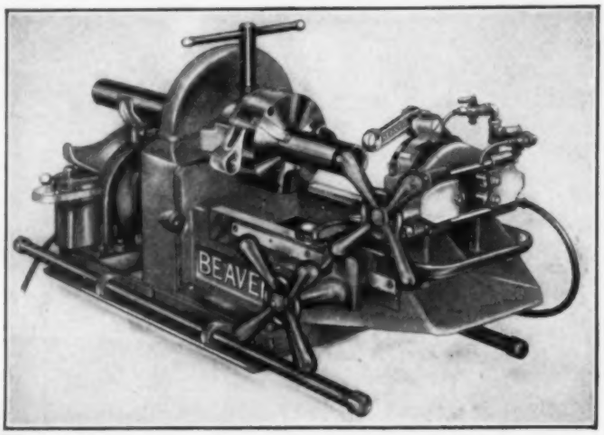
The A-B-C of Pipe and Bolt Machines • *From $135 up!*

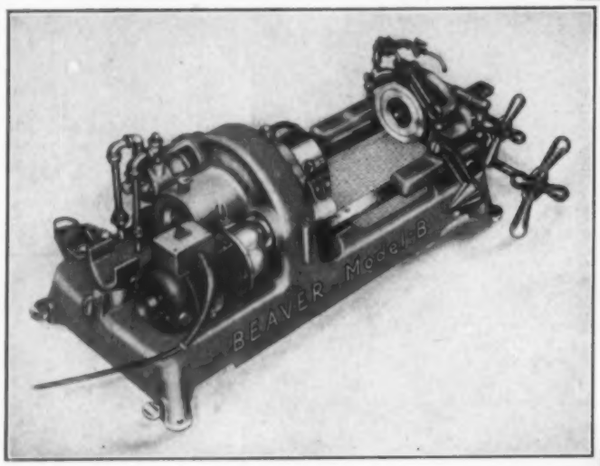
Beaver Model-A

A high-speed heavy-duty deluxe pipe and bolt machine, complete in every detail and admitted leader in its field. Will cut, thread and ream ⅛ to 2-inch pipe and, with drive shaft and geared tools, will cut and thread 2½ to 12-inch pipe. Threads bolts ¼ to 2-inch; cuts-off bolts (wheel cutter) up to ⅞-inch. New high speed model outperforms all competition. Right-handed—like a lathe. More than 50% greater open working space. All controls in front. Wheel or knife cutoff. Standard geared chuck with automatic safety wrench ejector. Safety shear pin. Ring-type opening adjustable dieheads—no hinge. Die segments adjust simultaneously as a unit. Choice 110 or 220 volt universal reversible motor. Automatic gear-driven oil pump. Easily portable when mounted on stand with 17-inch wheels. Weight approximately 415 lbs.

$344.50 up

Write for Bulletin A & What Users Say





Beaver Model-B

Beaver Model-B is a highly efficient ⅛ to 2" low-priced portable utility machine embodying many advanced features heretofore available only on higher priced machines. Complete range ⅛ to 8-inch pipe; ¼ to 1½-inch bolts. Rack-and-pinion feed; 60% more power; one-piece cast steel-iron base and cap—no flimsy sheet metal housing; sockets for pipe legs to form inexpensive but sturdy stand; all-steel geared universal ⅛ to 2-inch chuck—with safety automatic chuck wrench ejector; hinged full-range reamer; sliding wheel or knife cutoff; ring-type opening adjustable dieheads—no hinge. Automatic gear-driven oil pump or one-gallon oil reservoir optional. Adequate motor ventilation. Choice of 110 or 220 volt universal reversible motor. Easily portable when mounted on stand with 17-inch wheels. Used by such firms as Fisher Body; Du Pont; Bethlehem Steel; J. & L. Steel; scores of war contracts, etc. Weight approximately 280 lbs.

$264.50 up

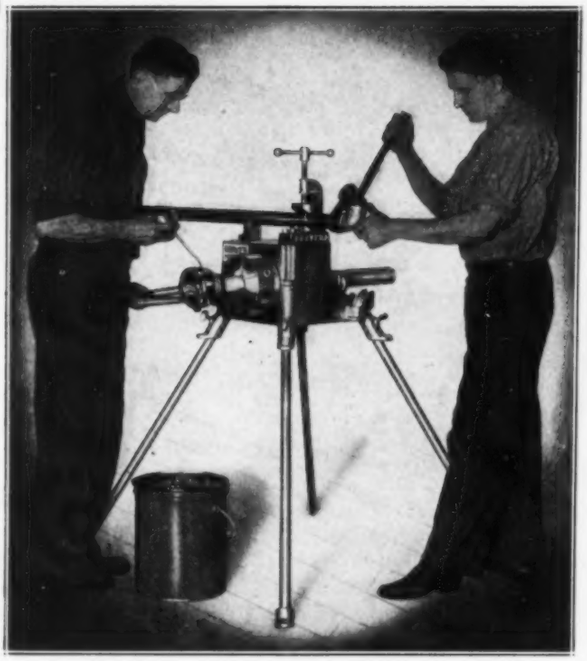
Write for Bulletin B & What Users Say

Beaver Model-C

Convert your present hand pipe tools into electric tools to cut, thread and ream ⅛ to 2-inch pipe. With drive shaft and geared tools 2½ to 8-inch pipe may be cut and threaded. Bolts up to 1½-inch size. Has ample power to allow for dull dies and low line voltage. Choice of 110 or 220 volt universal reversible motor. Now equipped with automatic chuck wrench ejector and safety latch—to protect machine and workman. Equipped with legs, vise and bender, as illustrated, the Beaver Model-C becomes a complete portable electric pipe shop. Model C-1 is furnished without vise; Model C-2 is supplied with vise. Set of Legs and Fittings, $5.50. Bender, $1.50.

$135.00 up

Write for Bulletin C & What Users Say



Write for complete Catalog of Beaver Pipe Tools (Hand and Power) — Cutters — Threaders — Reamers — Beveling and Grooving Tools, Pipe and Bolt Machines.

Quality Tools—Since 1900

BEAVER PIPE TOOLS

1100 Duff Avenue
WARREN • OHIO

SMALL TOOLS do BIG JOBS!

Save Time and Cut Costs . . . with Thor TOOLS In Scores of Ways!

HAMMERING open wall space with the Thor Electric Hammer, a light, yet powerful tool for use on hundreds of jobs in stone, wood or metal.

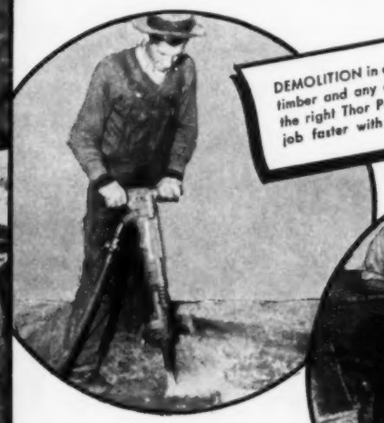
DRILLING anchor holes in all types of walls or foundations calls for the continuous power of the Thor ½-inch Electric Drill, lightest yet most powerful tool in its class.

SAWING heavy timber with the Thor 12-inch diameter Electric Saw, one of five available models for faster, safer work on heavy duty jobs.

DIGGING in clay, gravel, hard pan, frozen ground—in every heavy formation, is the job of the Thor Clay Digger, plus fast work also as a light demolition tool, pickhammer, or the like.

Designed and compactly built to minimum weight for *fast, easy handling,* Thor portable pneumatic and electric tools also pack the *power* that gets scores of construction jobs done faster . . . at less cost!

There's one of these *faster-working* Thor tools for every type of construction job—demolition, digging, hammering, sawing, drilling, nail driving, cutting, pumping and many others.



DEMOLITION in concrete, asphalt, stone, timber and any other material finds just the right Thor Paving Breaker to do the job faster with less air and time cost.

TAMPING with the Thor Backfill Tamper means putting the fill firmly into place to stay . . . no coming back on the job several times to backfill.

. . . Plus

ALL These Other Thor Tools For Fast, Money-Saving Construction

GRINDERS • WOOD BORERS • ROCK DRILLS
SUMP PUMPS • ACCESSORIES
For All Pneumatic and Electric Tools

Write today for information on how small Thor Tools can help you work faster, at less cost, plus other valuable tips, in Catalog 42-A.

Thor *Portable Pneumatic and Electric Tools*

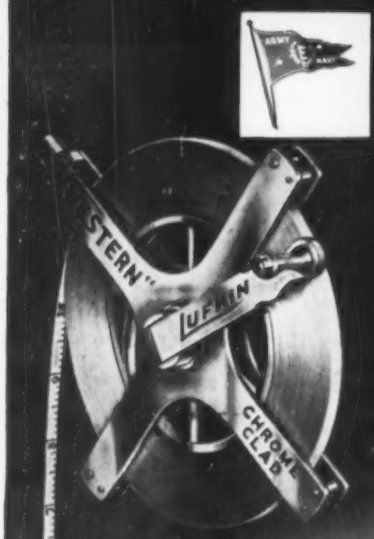
INDEPENDENT PNEUMATIC TOOL COMPANY

600 W. JACKSON BOULEVARD, CHICAGO 6, ILL.

Branches in Principal Cities

LUFKIN

"WESTERN" CHROME CLAD STEEL TAPE FOR HEAVY DUTY



For downright durability and all-around usefulness you can't beat a Lufkin "Western" Chrome Clad Steel Tape. Even in poor light, the jet black markings are easy to read against the satin chrome surface that won't rust, crack, chip or peel. The ¼-inch steel line detaches from frame and is often used like a chain tape. The sturdy frame and smooth winding mechanism add to a "Western's" utility and long life. See it at your dealers and write for our free catalog 12-C.

LUFKIN

SAGINAW, MICHIGAN • New York City

TAPES · RULES · PRECISION TOOLS

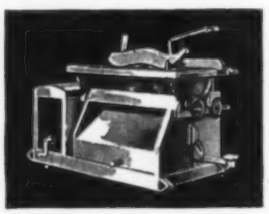
ALLAYING CEMENT DUST satisfactorily and economically is made possible by use of Synkrete Concentrate which is claimed by its makers to provide coverage for at least 1,000 sq. ft. per gal. and to reduce cost of treatment to small fraction of a cent per sq. ft. Diluted with three parts water before use, Concentrate is easily applied by mop, brush, long handled broom or sprinkler. Soaks deep into pores of dusty concrete where it hardens to form rock-like water insoluble mass that reinforces binder and prevents surface particles from being worn away. After treatment with Synkrete, cement floors are claimed to be far harder, more resistant to traffic, water infiltration, oils, greases and chemicals. They also are easier to maintain with less drag in sweeping. Effect of treatment also is said to be lasting. While single coat will allay dust, two or more are usually recommended for best results. Liquid is almost colorless and does not affect appearance of floors. When floors are to be painted later, a treatment with Synkrete acts as a sizing and paint will last longer with less tendency to peal or blister.—**Synthex Products Co., 2 W. 45th St., New York 19, N. Y.**

★ ★ ★

READY-MIXED EXTERIOR PAINT FOR MASONRY is claimed to simplify and improve method of protecting surfaces of this type exposed to weather. Other advantages: Resists lime and alkalai; spreads over damp or dry masonry; adheres to smooth or rough surfaces. When Fungus-Ban is added to this paint a protective coating is provided to combat attack of fungi.—**The Wilbur & Williams Co., Park Square Bldg., Boston, Mass.**

C.H.&E.

SAW RIG



No. 33 Saw Rig

We also manufacture Pumps—Hoists—3 Ton Rollers—Bar Cutters and Benders.

Write for catalog.

C. H. & E. Manufacturing Co.
3847 No. Palmer St.
Milwaukee 12, Wis.

It's Sonotube Laminated Fibre Tubing

Ready to pour concrete pier and column forms

Cut to Pier Heights on the job

IMMEDIATE DELIVERY

6 Standard Sizes
Up to Twenty-Four Feet Long

INSIDE DIAMETER					
8"	9"	10"	11¼"	12"	13½"
SQUARE INCHES					
50.26	64	78.54	100	113.1	144

Smaller sizes available.

Successfully Used for Column Forms up to 14 feet and Pier Forms up to 10 feet

SONOCO PRODUCTS COMPANY
HARTSVILLE, S. C. MYSTIC, CONN.
ROCKINGHAM, N. C. GARWOOD, N. J. LOWELL, MASS.

A name to remember when buying a Shovel, Dragline or Crane

LIMA

LIMA Cranes, Shovels and Draglines are not the achievement of a day - - they are the result of constant improvement and advancement in design and construction over a long period.

Every shovel, crane or dragline - - large or small - - that bears the LIMA trade-name is a quality machine that in design, performance and efficiency gives the greatest value for your investment.

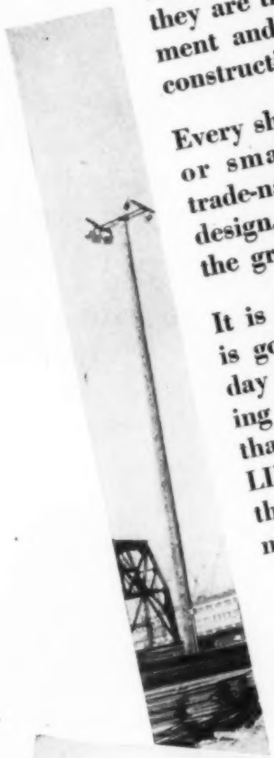
It is true that most of our production is going to the armed forces, but the day is coming when you will be placing orders for new equipment. When that day comes remember the name LIMA. The Crane, Shovel or Dragline that gets things done quicker, safer and more economically.

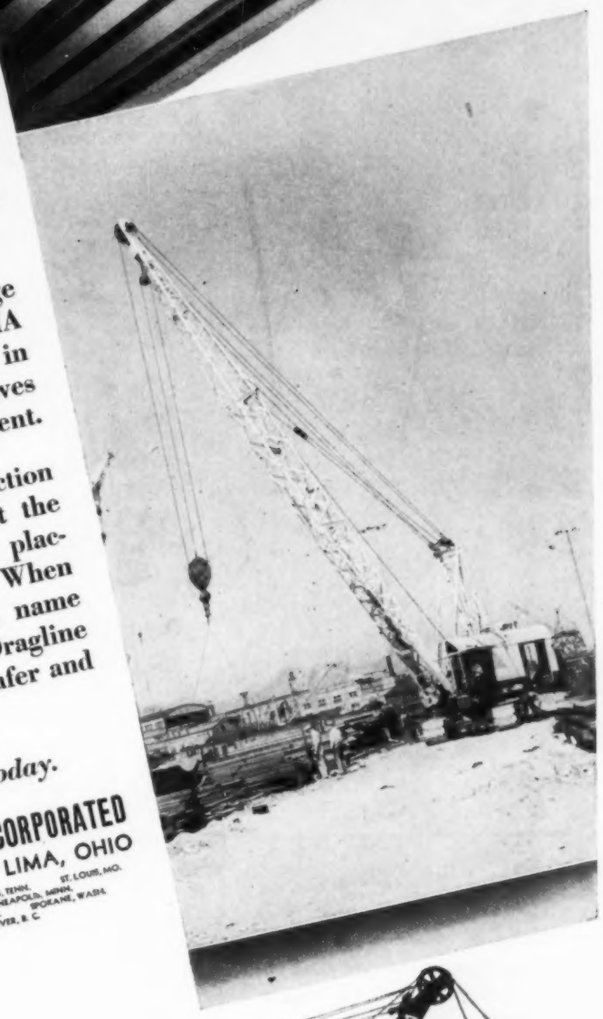
Write for Free Bulletin Today.

LIMA LOCOMOTIVE WORKS, INCORPORATED

Shovel and Crane Division - - LIMA, OHIO

NEW YORK, N.Y. PHILADELPHIA, PA. NEWARK, N.J. MEMPHIS, TENN. ST. LOUIS, MO.
DALLAS, TEXAS PORTLAND, ORE. MINNEAPOLIS, MINN.
SEATTLE, WASH. SAN FRANCISCO, CALIF LOS ANGELES, CALIF. SPOKANE, WASH.
MONTREAL, Quebec, Can. VANCOUVER, B. C.





SHOVELS ¾ Yd. to 5 Yds. | **CRANES** 13 Tons to 100 Tons | **DRAGLINES** VARIABLE

Shovels Are Weapons, Too

Good Blasting S-t-r-e-t-c-h-e-s Their Life

Increase production by getting more work out of your present equipment. Make buckets stretch—as far as possible, and last as long as possible.

Good blasting is one of the most effective "bucket-stretchers" you can find. For your construction quarries examine the qualifications of

ATLAS APEX

Low nitroglycerine, ammonium nitrate type of explosive with a heaving, spreading action. Adapted for use in either horizontal or vertical drill holes. Available in eight strengths—each strength in three velocities (low, medium, or high)—there are 24 combinations of speed and strength. One of these should provide just the right action for your formation.

Working synergistically* with explosives users, Atlas representatives have been able to help on many jobs. Perhaps they can make your equipment go further, too.

***Synergism**—*The meeting of minds "clicking together" from the impact of ideas to give a result greater than the sum total expressed—a "2 + 2 = 5" result. Synergism can be a big help toward making your equipment last longer.*

APEX

GRADE	% Weight Strength	Velocity feet per second, in the open 1¼" x 8"	VELOCITIES 4½" x 16" CTGS.			Number of Cartridges per 50 lbs. 1¼" x 8"
			LOW	MEDIUM	HIGH	
A	35	7000	10500	13000	19000	115
B	30	6900	9500	13000	19000	115
C	25	6500	9000	13000	19000	115
D	20	6500	9000	13000	19000	115
1	40	7200	10500	13000	19000	115
2	50	7300	10500	13000	19000	115
3	60	7500	10500	13000	19000	115
4	70	7800	10500	13000	19000	115
Standard packing for Apex is			4" x 8¼ lbs. 5" x 25 lbs. 7" x 50 lbs.	4" x 12½ lbs. 6" x 25 lbs. 7½" x 25 lbs.	5" x 12½ lbs. 6" x 50 lbs. 7½" x 50 lbs.	5" x 16¾ lbs. 7" x 25 lbs. 8" x 50 lbs.

Apex: Reg. U. S. Pat. Off.

ATLAS EXPLOSIVES

"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • Offices in principal cities • Cable Address—Atpowco

Times are different NOW . . .

BUT YOU CAN STILL BANK ON PURPLE STRAND QUALITY

Remember when scenes like this excited no comment? When bridge construction was an everyday activity? When newer and taller skyscrapers nosed their way upward?

Those were the days when war was only an ugly word, and your Purple Strand rope was devoted entirely to peacetime uses. You put it to work lifting girders, plates, I-beams. If the job required rope that was not only strong and durable but also highly flexible, you asked for Purple Strand Form-Set. You knew that Form-Set, Bethlehem's preformed rope, would spool easily, handle well, and laugh at bending fatigue. You knew, in short, that it was a healthy, long-lived rope and therefore economical.

Today that vitality is even more important, for every foot of wire rope is precious. So, when you plan to reeve those boom, hoist, or bucket lines, keep asking for Purple Strand Form-Set. Perhaps the work you're doing isn't the same as it was in the prewar days, but it's probably just as tough, and that's the best reason for having a top-quality rope on your payroll.

Purple Strand Form-Set is the finest grade of wire rope we offer. You can depend on it now, just as you could before the war. And that's a promise for future days, too.

When you think WIRE ROPE

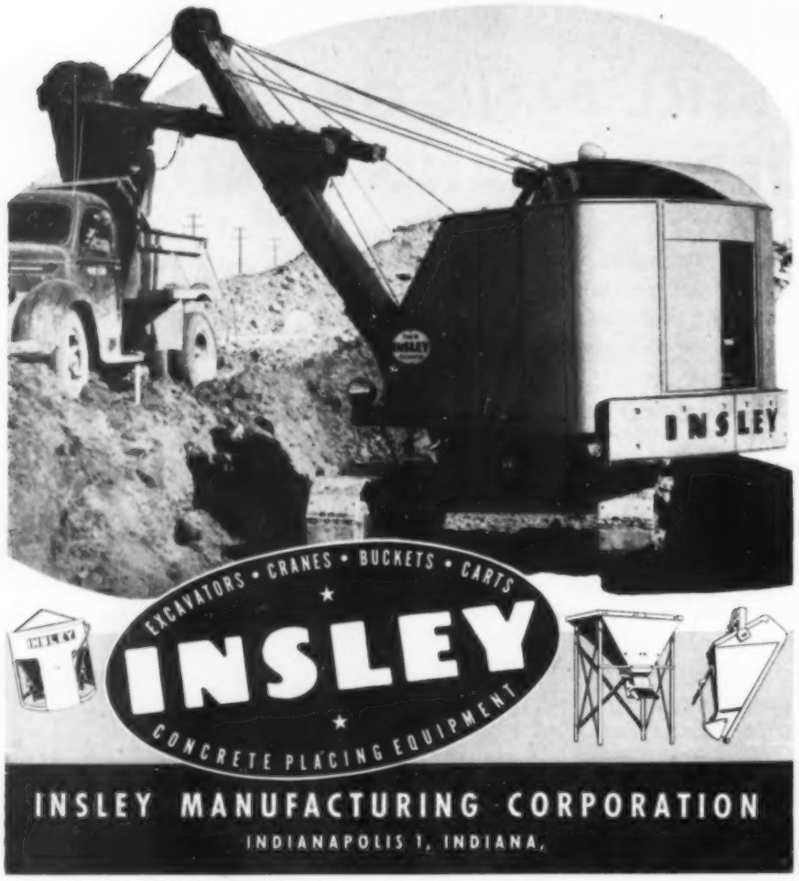
. . . think BETHLEHEM

Safer ON SOFT SOIL

The Insley Excavator's long, wide crawlers—self-cleaning and individually controlled—assure safe operation on soft soil . . . keep the job moving at top speed.

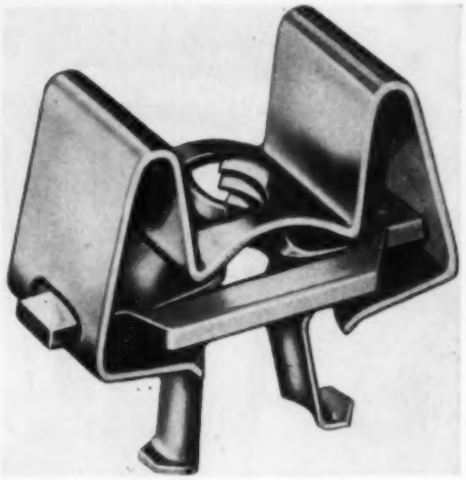
This is one reason why Insley equipment has done such an outstanding job on the fighting fronts . . . one reason why all the dirt moving and material handling equipment we can build is going to our armed forces.

Against the day when new 3/8 and 1/2-yard Insley Excavators, Draglines, Cranes and Trench Hoes will again be available for civilian operators, we suggest that you investigate Insley's application to your job.



INSLEY MANUFACTURING CORPORATION
INDIANAPOLIS 1, INDIANA.

SELF LOCKING SPEED NUT requires no riveting, welding or spinning operations, nor any special tools for insulation in screw-receiving position for blind attachments. Cage is merely compressed and legs are inserted into clearance hole. Legs spring apart when pressure is released, turned up ends just clearing the back side of the panel. The



nut will hold tight against the force of inserting the screw and the screw-tightening torque, and the floating speed nut within the cage allows for any misalignment of clearance holes. Although designed originally for front mounting of aircraft instruments, this new cage nut may be used for any kind of blind attachment. It is available in two styles to fit panel thicknesses from .062 in. up and requires only one clearance hold of .171 in. dia. to attach.—**Tinnerman Products, Inc., 2116 Fulton Road, Cleveland, 13, Ohio.**

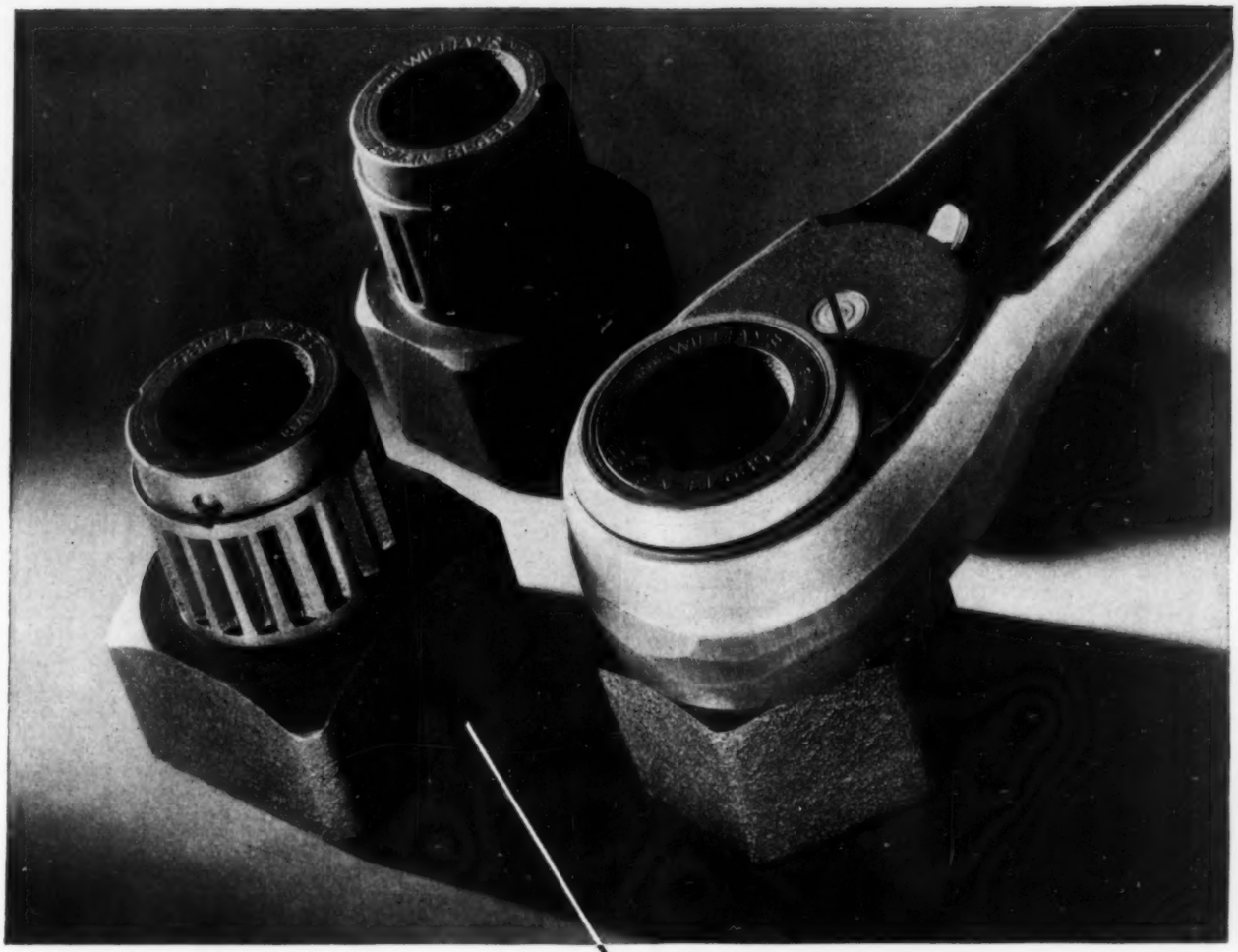
Easier Way To Remove Lime Scale From Diesel Cooling Systems

Built-up lime scale in water jackets or radiators is a frequent cause of over-heating in Diesel and gasoline power units. Scored cylinders, loss of power, increased consumption of gasoline and oil . . . any or all may be indications of this condition.

Preventive maintenance is the answer to this common trouble. Treat cooling system periodically with Oakite Compound No. 32. Its specialized action QUICKLY, effectively removes lime scale and rust that impair proper heat transfer . . . restores cooling system to normal operating efficiency. Write for FREE helpful 28-page manual containing specific recommendations for this important maintenance job.

OAKITE PRODUCTS, INC.
24G Thames St., New York 6, N. Y.
Technical Service Representatives Located in All Principal Cities of the United States and Canada

OAKITE *Specialized* CLEANING



To By-Pass Bottlenecks

The principle of line production, so spectacularly developed by American Industry, succeeds only when every step in the productive sequence is completed on schedule. Better Tools and better machines are usually the cure for bottlenecks. Big, able, active Wrenches like Williams' "Superector" are frequently the answer when something *super* in the way of wrench *power* and *speed* is indicated. J. H. Williams & Co., Buffalo 7, New York.

WILLIAMS

DROP-FORGINGS AND DROP-FORGED TOOLS

M. S. A.

A DOZEN REASONS WHY— Skullgards PROVIDE THE BEST HEAD SAFETY FOR YOUR WORKERS!

★ Laminated bakelite construction protects against bumps and falling or flying objects.

★ Extra protection afforded by steel screen in crown molded integrally with bakelite.

★ Deep crown for fullest protection — rounded contours deflect flying objects.

★ High dielectric strength.

★ Light weight — comfortable as an old felt hat.

★ Smooth surface inside and out.

★ Easy to keep clean and sterilize.

★ Impervious to moisture, heat, common chemicals.

★ Uniform in thickness throughout.

★ Reinforced bead on brim.

★ Ample ventilation between sweat band and wall.

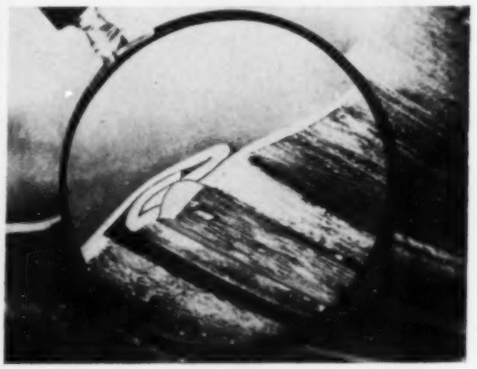
★ Easy removal of lining for replacement.

Check these outstanding features and you'll *know* why M. S. A. Skullgards are the world's most popular work hats!

For outstanding production achievement . . . the Maritime "M" Pennant and Victory Fleet Flag, awarded to M. S. A. by the U. S. Maritime Commission.

MINE SAFETY APPLIANCES COMPANY
BRADDOCK, THOMAS AND MEADE STREETS · PITTSBURGH, PENNA.
District Representatives in Principal Cities

WELDED LOCK SEAM, made at the factory before galvanizing, now extends spirally the entire length of helical corrugated housing for Ric-wil prefabricated insulated pipe units assuring permanently pressure tight, waterproof conduit. Sections are 21 ft. long, complete fabricated with pipe or pipes, as specified, insulation and aligning pipe supports. Conduit ends are expanded smooth for a



distance of 3 in., removing corrugations to facilitate tight field connection of sections. New drive coupler is adaptable to mechanical or welded closure with minimum of field labor. Conduit is available in several types for piping steam, hot water or oil. Single pipe systems or multiple systems with any specified combination of pipes are constructed to requirements, with insulation to specified thickness. Expansion loops, elbows, tees, anchors and all accessories necessary for complete system are prefabricated, reducing installation to mere assembly of units.—**The Ric-Wil Co., 1572 Union Commerce Bldg., Cleveland, Ohio.**

Shunk Snow Plow and Ice Removal BLADES

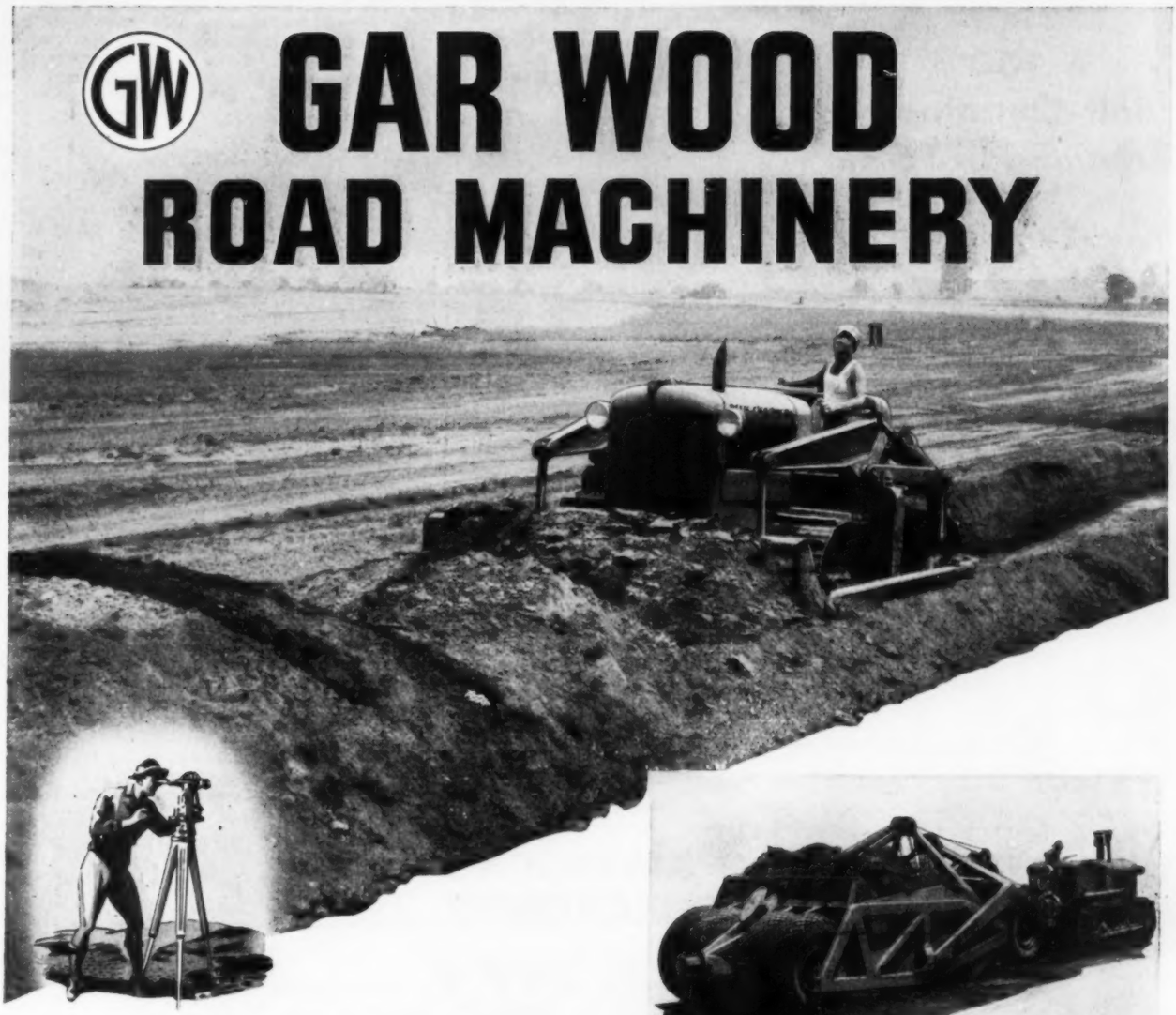
Proved record of superior performance. Made of specially developed steel to withstand severe service conditions.

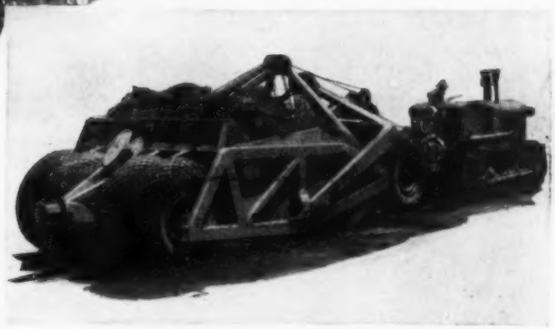
FOR ALL TYPES AND MODELS OF SNOW PLOWS
Various widths, lengths, thicknesses--flat or curved--standard or special--punched ready to fit your machine.

SHUNK SAW-TOOTH ICE BLADE
Amazingly effective. Thoroughly breaks up and removes heavy, slippery ice and snow formations. Replaces all types of snow plow blades or maintenance units. Write for Bulletin and name of nearest Distributor.

Shunk
MANUFACTURING COMPANY
ESTABLISHED 1854
BUCYRUS, OHIO.

GAR WOOD
ROAD MACHINERY





Make your blueprinted plans NOW for postwar earthmoving . . . make sure Gar Wood 2 and 4 Wheel Hydraulic Scrapers, 4 Wheel Cable Scrapers, Hydraulic and Cable Dozers and Trailbuilders, Hydraulic and Cable Rippers and Tamping Rollers are included in your Equipment Plans. This is double assurance that your planning is up to the minute.

Look to Gar Wood and BE READY

GW ROAD MACHINERY is Sold Through ALLIS-CHALMERS Dealers Everywhere

ROAD MACHINERY DIVISION
GAR WOOD INDUSTRIES, Inc.
DETROIT 11, MICHIGAN

A 100% Self-Contained Demolition Tool

the

SYNTRON

Gasoline Hammer

PAVING BREAKER

No Air Compressor and Hose
No Battery Box and Cable
No Springs

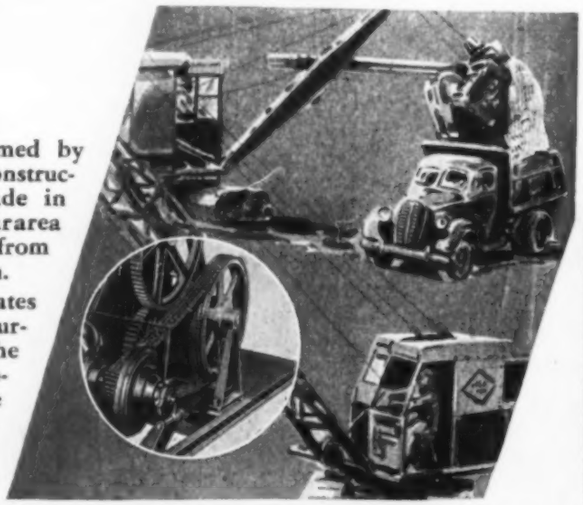
SAVES MONEY, TIME and LABOR

Busting Concrete — Cutting Asphalt
Breaking Rock — Digging Shale—Tamping
and many other jobs

Investigate its advantages—write today—

SYNTRON CO., 500 Lexington, Homer City, Pennsylvania

FOR THE DRIVES ON AMERICA'S FINEST CONSTRUCTION MACHINERY



The services performed by the world's finest construction machinery (made in America)—in every war area have brought acclaim from every military branch.

Diamond appreciates serving the manufacturers who have built the wide range of equipment required in the War effort. Our engineers are ready to work with you in the selection of appropriate roller chain drives for improved models or redesigns.

DIAMOND CHAIN & MFG. CO., 418 Kentucky Ave., Indianapolis 7, Ind.
Offices and Distributors in All Principal Cities.

DIAMOND **ROLLER CHAINS**

4½-IN. DIAL THERMOMETER, used extensively by the shipbuilding industry, is a mercury actuated instrument built to withstand severe operating conditions. Especially suited to installations requiring a long length of tubing between bulb and instrument. Plastic case is resistant to corrosion and

shock. To make reading at a distance easy, the metal dial is finished in black with white figures. May be had in a wide variety of standard temperature-sensitive bulb constructions and is available in following ranges: —40 to 120, 40 to 220, 350 to 550, 400 to 900, —10 to 110, 80 to 300, 300 to 750, 30 to 150, 50 to 400 and 200 to 900 deg. F.— **Taylor Instrument Companies, P. O. Box 110, Rochester 1, N. Y.**

★ ★ ★

DUAL-PURPOSE LIFT TRUCK for short distance transportation and also for stacking and tiering duties has a working speed of 12 mph. either forward or backward, ability to turn in its own length of 117 in., on overall width of 60 in. and a capacity of 7,500 lb. Operates on three large pneumatic tires and easily negotiates rough floors or outside

unimproved storage areas. Manufacturer claims that a loaded unit can go anywhere from a standpoint of tractive effort that a truck can go and will climb comparable inclines. On standard models the height of lift from ground to underside of load is 108 in. This distance may be altered on special orders and adapted to special materials handling problems. — **Willamette Hyster Co., Portland 8, Oregon.**

Right down the Line

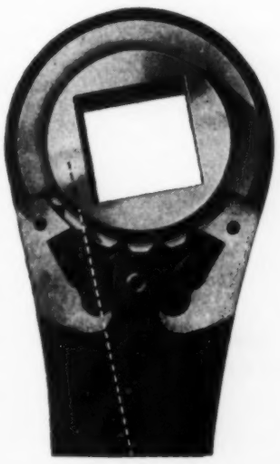
LOWELL
RED RATCHET WRENCHES
Prove their Worth

That SPEED and SAFETY are needed in Tunnel Work, Electric Tower Erection and in SHIPBUILDING, to-day, is an axiom. Heavy constructors doing a great variety of work need the best tools to complete jobs on time. So you encounter LOWELL Red Ratchet Wrenches on a wide diversity of heavy construction — evidence that successful contractors think alike about essentials.

Until the War is over, distributors' stocks may be short of LOWELL WRENCHES. In the meantime, note them down for your first Post-War orders.

Straight Line LEVERAGE!

See how each pawl, when engaged, transmits leverage from the solid stock of the handle, direct to the gear in a *straight line* and with a square contact. The pawl is in compression only — no shear, no tension, no torsion. The shipper carries none of the load. This strong construction insures steady service.

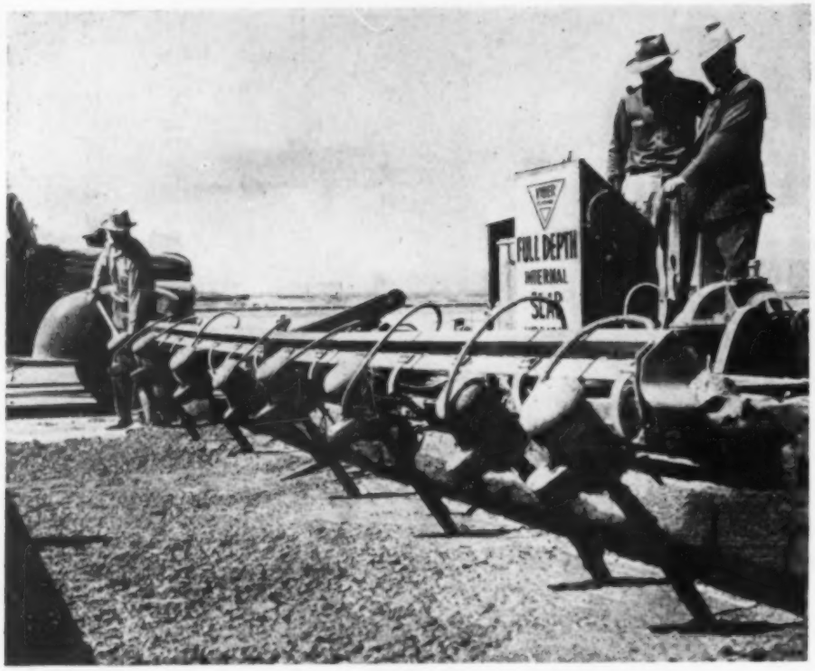


ARMY NAVY

LOWELL WRENCH CO.
WORCESTER 8, MASS.

1869 **1944**

PREVIEW



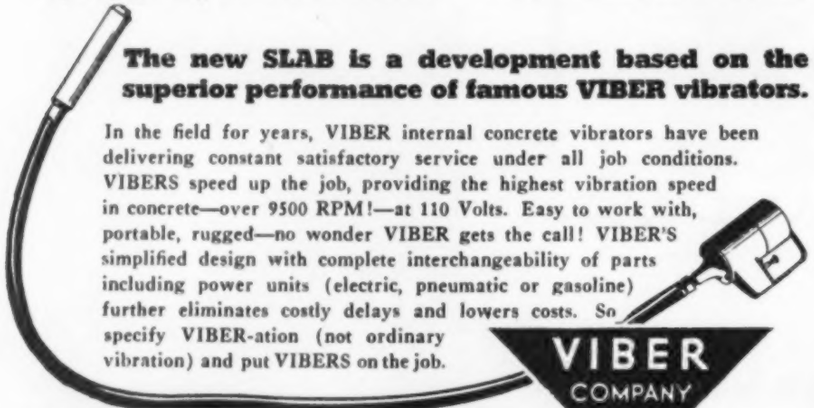
A NEW MACHINE FOR A NEW ERA

VIBER SLAB

ENGINEERS know that a period of unparalleled construction activity begins when Victory is won. But plans, methods, equipment can't wait for the final gun. Viber Company, pioneer in producing concrete internal vibration equipment, has slanted its research and experimentation to the new specifications of postwar. One such development is the VIBER SLAB, a multiple, high-speed internal concrete vibrating machine specially designed to help build tomorrow's heavy-duty airport runways, aprons, highways.

Tests already performed definitely reveal: (1) VIBER SLAB will vibrate the stiffest concrete on slabs as fast as it can be economically placed on the sub-grade. (2) The battery of "Vibers" will vibrate the ENTIRE DEPTH (*not just the top surface*) of super-thick slabs. (3) Viber's "Viber-ation" in low slump concrete slabs produces strengths not now obtainable with present day equipment, and at a new low cost not now approached.

Expect big things of VIBER SLAB . . . a new machine for a new era!



The new SLAB is a development based on the superior performance of famous VIBER vibrators.

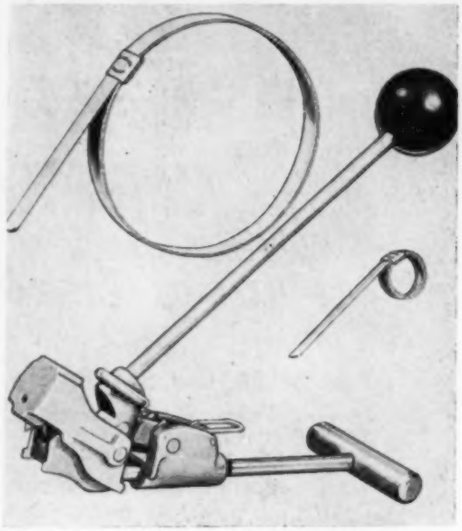
In the field for years, VIBER internal concrete vibrators have been delivering constant satisfactory service under all job conditions. VIBERS speed up the job, providing the highest vibration speed in concrete—over 9500 RPM!—at 110 Volts. Easy to work with, portable, rugged—no wonder VIBER gets the call! VIBER'S simplified design with complete interchangeability of parts including power units (electric, pneumatic or gasoline) further eliminates costly delays and lowers costs. So specify VIBER-ation (not ordinary vibration) and put VIBERS on the job.

VIBER COMPANY

726 South Flower Street, Burbank, California

ORIGINATORS OF INTERNAL CONCRETE VIBRATION

HOSE CLAMP, named Punch-Lok, available in sizes from ¾ to 48 in. I.D. is mechanical device for connecting various kinds of male and female fittings, special nipples, menders or ordinary pipe to (1) wire woven and braided hose used in control of hydraulic machines such as coal excavators, road scrapers and snow plows, acetylene and pneumatic tools, electric welding and sand blasting;



(2) to any kind of flexible coupling between rigid pipe lines or fittings for air, steam, bituminous materials, and gasoline or oil; (3) to ordinary air and water hose. Engineered for application without injury to hose itself. In making connection, broad, flat, high-tensile-strength galvanized steel band is double wrapped around joint. After tensioning with pull of 1,000 lb. within tool, ends are securely locked together without loss of tension within flat pressed steel clip and the excess band cut off flush with clip so that entire joint is streamlined for safety. Used not only for connecting high pressure hose, but also for splicing electric welding cable, stopping leaks in steam and water lines, reinforcing and mending splits in cross-arms and ladder rails, tying rigid conduit or flexible cable to existing pipelines or girders, and seizing ends of wire or manila rope to prevent fraying. No. 3 clamp with ⅜-in. band width is designed for applications ranging from ¾-in. O.D. down to 3/16 in. I.D. hose. Clamps ranging in diameter from 1 to 48 in. I.D. have band width of ⅝ in.—**Punch-Lok Co., 321 N. Justine St., Chicago 7, Ill.**

★ ★ ★

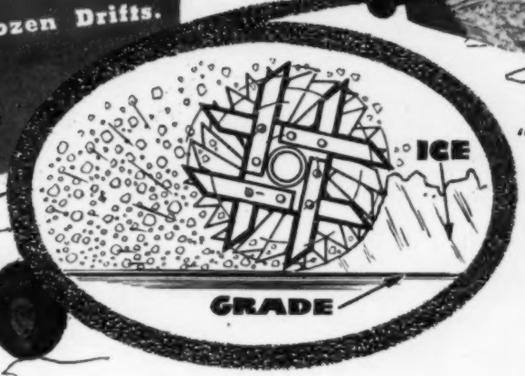
SELF-BONDING FLOOR MATERIAL, known as Stonoleum, said to feel like rubber and to wear like stone, may be laid over old concrete, cement, wood or composition without adhesives or separate bonding agents. Available in paste form, its unique colloidal composition gives material greater resistance, not only to direct impact and load, but also to continuous vibration, abrasion and other effects of traffic. Another characteristic: self-healing feature which assures filling up under ordinary traffic of holes left when machines or fixtures are removed. For installation no chipping, chopping nor skilled labor is needed, any plant handy man applying it with ordinary leveling tools. Stonoleum may also be used as patch material because it bonds without adhesives or bonding agents. Requires about 48 hr. to dry.—**Continental Asbestos Refining Corp., 1 Madison Ave., New York City.**

WINTER

AND THE SEAMAN PULVI MIXER

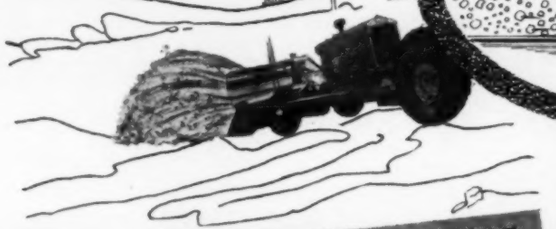
Like Giant Icepicks,—The New Seaman "Shock-Cushioned" Tines Chop, Pulverize and Clear Ice on Runways and Highways and Level Hardpacked, Frozen Drifts.

Sometimes a longitudinal pass over hard packed snow drift is best; other times a series of cross cuts does the job. Method is usually governed by convenience in access.



The SEAMAN "Shock-Cushioned" Tine

Impact with ice is "cushioned" by a compensating device which holds each tine group rigid with the rotor until contact-shock reaches engineered limit. This limit however is beyond shattering point of ice. Tine groups then stop individually until obstacle is cleared and before tine breakage can occur.

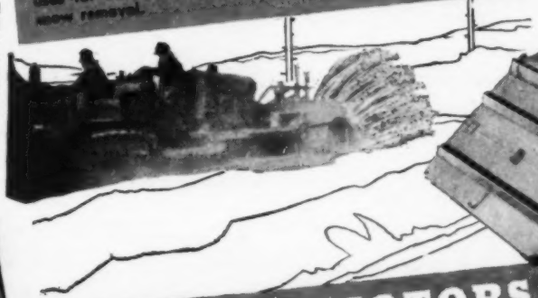


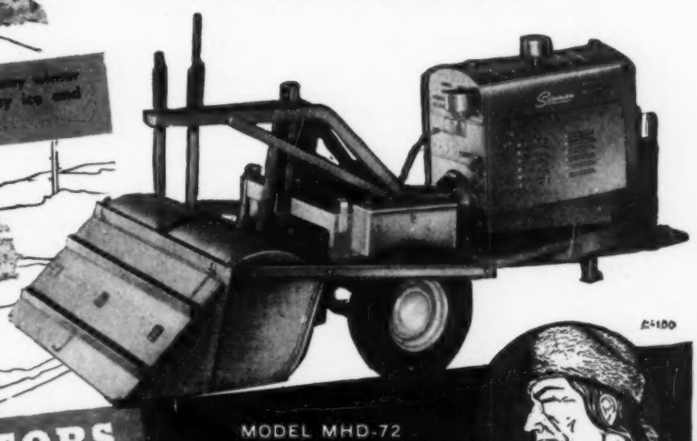
Removing thick rutted, uneven sheet of ice. Tines do not reach pavement but shatter and pulverize ice through to pavement surface.

STAND CLEAR when the SEAMAN MIXER — equipped with the new "shock-cushioned" tines — roars down a rutted, ice-covered runway or road, — for an avalanche of chopped, pulverized ice erupts from the open hood — and leaves a leveled path behind . . . Frozen, hard-packed drifts are cleared in a minimum of time when the Seaman "gets its teeth in 'em" . . . There's no damage to the pavement for the spinning rotor can be so set that the tine periphery does not contact the paved surface . . . And since each individual group of tines is governed by a compensating device which stops any group momentarily when excessive shock is encountered, — tine damage is negligible.

SEAMAN" Shock-Cushioned" Tines Interchangeable with Previous Models. For soil stabilization, earth compaction, root removal and the many other jobs more efficiently performed by the SEAMAN, the new "shock-cushioned" tines reduce replacement to a small fraction of former cost. Change-overs to the "shock-cushioned" tines are readily made in the field at low cost by any experienced mechanic. INVESTIGATE THIS SEAMAN IMPROVEMENT NOW.

The new Seaman "shock-cushioned" tine opens many winter uses for SEAMAN MIXER in airfield and highway ice and snow removal.





Frequently called "the most useful informational booklet in the soil stabilization field"—SOIL STABILIZATION METHODS, compiled by SEAMAN engineers is yours without charge. Ask for Bulletin C-24

SEAMAN MOTORS

MILWAUKEE 3, WISCONSIN

MODEL MHD-72

PIONEERED by Seaman

When fewer men must do a bigger job...

Any measure that saves man-hours becomes increasingly important when costs are the governing factor.

Every time a worker leaves his job for a drink of water, precious moments are wasted; every time he is a sick-absentee whole days are lost.

A Quicker, Safer Method...

The use of Dixie Portable Water Carriers has solved the problem on many a wartime construction project. Men are served in minimum time right where they work... and each drinks from a clean, individual Dixie or Vortex Cup.

They help to check contagion at the contamination point...avoid the possible spread of disease from mouth-to-mouth contact. And workers are far better satisfied with this modern watering method.

Write for descriptive folder giving complete information on this portable water service, including tanks, dispensers and cups.

Dixie and Vortex Cups are made at Easton, Pa. Chicago, Ill., Darlington, S. C. and Toronto, Canada.

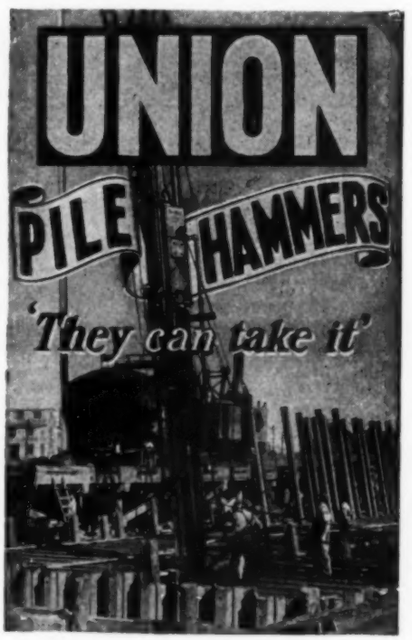
DIXIE CUPS

DRINKING CUPS AND FOOD CONTAINERS

TWO TYPES OF RUST PREVENTIVE. identified by names "Cyclodiene" and "Percyclodiene," are metal cleaning solvents which leave protective films that prevent rust and tarnish. Both are used as short time simple immersions at room temperature and are placed in an open tank made of metal, glazed ceramic or other material. Neither will attack metals as they are neutral and contain no acids, alkalis or water. Cyclodiene films dry in about 20 min. leaving rust inhibited clean surfaces for some time thereafter. Percyclodiene film will remain for about 30 days. Quick dip into either one of these solvents either before or between final finishing operations will protect work from rust and corrosion. Penetration said to be excellent and protection is afforded to threaded parts, joints, interstices and crevices.—**Technical Processes Division, Colonial Alloys Co., Philadelphia, Pa.**

★ ★ ★

PLYWOOD CALCULATOR. named "Keely Plyform Calculator," is designed to save time by speeding up estimation of amount and size of plywood, studs and wales needed for any given plywood concrete form. Knowing rate of pour, whether vibrated or unvibrated, and height, length and thickness of wall, lumber estimator, architect, contractor, engineer or construction supervisor can in a few minutes and with one setting of this slide rule device not only arrive at an accurate estimate of material needed to construct forms, but also save much labor in looking up formulas and in figuring. Designed by Hal Keely, president of National Plywood Distributors Association, Inc., calculator is available from the Association for $1.00.—**National Plywood Distributors Association, Inc., 111 W. Washington St., Chicago 2, Ill.**



Ready!—for quick reference and ALL FACTS on what UNION makes for speedy plant construction — write or wire NOW for Catalog 184E.

EST. 1900
Union Iron Works, Inc.
ELIZABETH, New Jersey

Two on the Aisle at the Beach-Head Bijou

The empty rope reels our fighting men sometimes use in their improvised theatres can mean but one thing . . . that our engineers are using plenty of tough, dependable wire rope in the operation of cranes, shovels, draglines and bulldozers.

Add to these demands the requirements of the industries providing supplies for our fighters, and it's easy to see that in spite of greater production there still isn't enough Wickwire Spencer Wire Rope to meet all demands.

To help conserve wire rope we suggest that you send for copies of our book, "Know Your Ropes," which is packed with ideas to help make wire rope last longer. And, when you do need rope, get WISS-COLAY *Pre*formed. It not only lasts longer than the non-preformed, but it's easier to cut, splice and install; it's kink-resistant and safer to handle.

If you have a particular wire rope problem our wire rope engineers will be happy to be of service. Write Wickwire Spencer Steel Company, 500 Fifth Ave., New York 18, N. Y.

PROPER SHEAVE LOCATION LENGTHENS ROPE LIFE

Increasing the distance between the main sheave and the drum will reduce side wear of the rope. This and 39 other wire rope life savers; 78 "right and wrong" illustrations; 20 diagrams and charts—are all in our 82 page book, "Know Your Ropes."

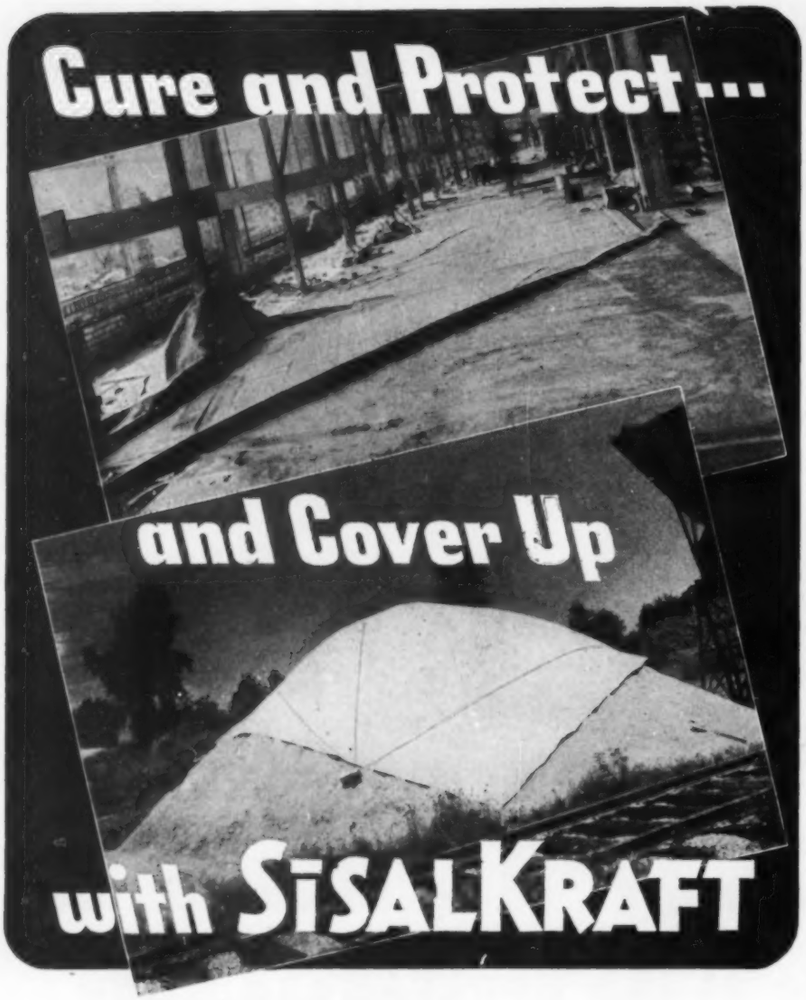
SEND FOR YOUR FREE COPY

Send your wire rope questions to:

WICKWIRE SPENCER STEEL COMPANY

500 FIFTH AVENUE, NEW YORK 18, N. Y.

Abilene · Buffalo · Chattanooga · Chicago · Detroit · Houston · Los Angeles · Philadelphia · San Francisco · Tulsa · Worcester



THE SISALKRAFT Blankets shown in the upper illustration are being used for the *fourth time* to cure concrete floors and protect the surfaces from debris and drip. Note the splendid condition of the SISALKRAFT *seven days* after application. Note also the moisture on the concrete after the SISALKRAFT has been turned back.

Stock pile covers, made with SISALKRAFT, are lightweight, easy to handle, low in cost. SISALKRAFT is specially treated for high "wet strength" to resist scuffing and rot. This processing of the kraft paper, plus the two-way fibre reenforcement, embedded in asphalt, results in scuff-resistant and waterproof properties that give dependable protection at moderate cost.

Put SISALKRAFT *first on your list for concrete curing and general job protection.*

THE SISALKRAFT CO.
205 W. WACKER DRIVE · CHICAGO 6, ILL.
NEW YORK · SAN FRANCISCO · LONDON · SYDNEY

Manufacturers of
SISALKRAFT, FIBREEN, SISAL-X, SISALTAPE AND COPPER-ARMORED SISALKRAFT

NEWS FROM MANUFACTURERS

About Their Products

The publications reviewed below will keep you posted on latest developments in construction equipment and materials available for your use.

MOTOR GRADERS—**The Galion Iron Works & Mfg. Co.**, Galion, Ohio (27 pp. illustrated) Describes and pictures activities of two models of motor graders, No. 101, designed for heavy grading and No. 201 for ordinary work where maximum power and weight are not required. Outstanding features of these graders used in road, airport, dam and housing construction are listed and graphically illustrated: (1) Powerful engine over-axle design with gear-type tandem drive; for proper weight balance; (2) diesel power; (3) power assembly with gear transfer drive; (4) rugged transmission and rear axle assembly; powerful, smooth operating tandem drive; (5) strong rigid frame assembly; (6) full hydraulic control; (7) heavy-duty front axle and steering assembly; (8) rigid drawbar and circle assembly; (9) moldboard and blade construction; (10) easily adjustable blade lift; (11) full revolving, full reversible blade. (12) V-type scarifier; (13) open or inclosed cab. One page is devoted to accessories and one to general specifications.

★ ★ ★

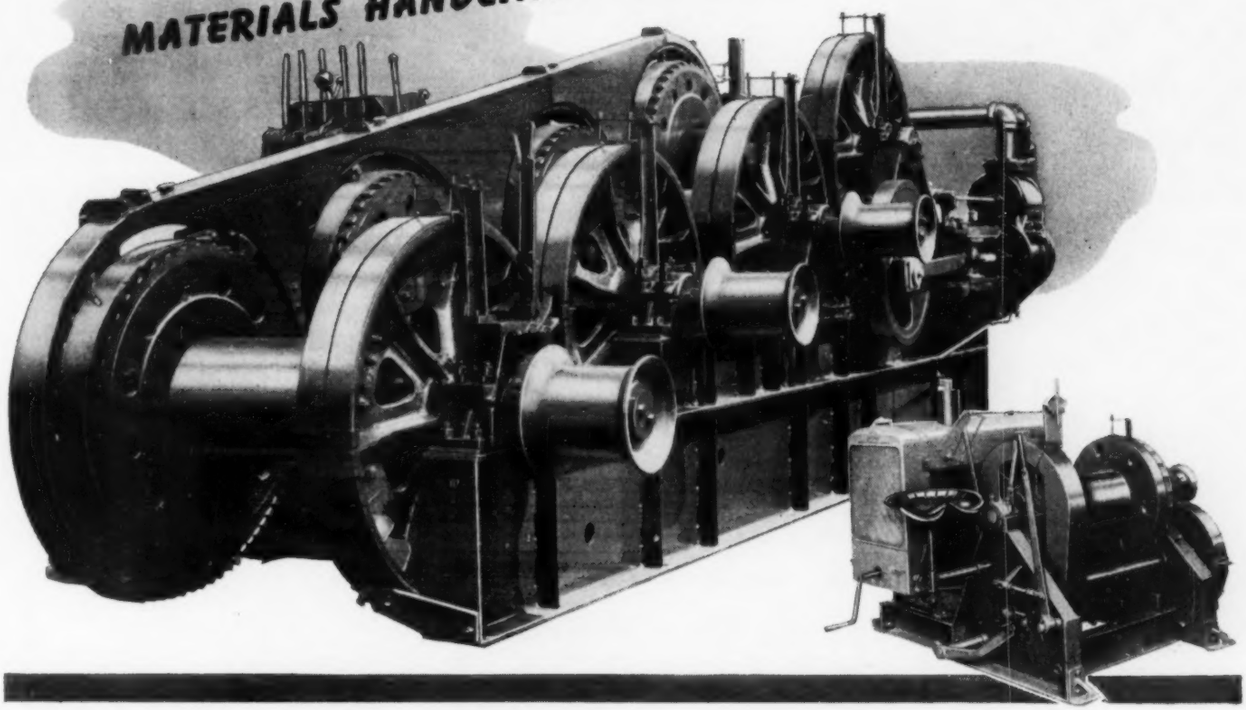
FORCE FEED LOADER—**Athey Truss Wheel Co.**, 5631 W. 65th St., Chicago 38, Ill. (6 pp., illustrated.) Folder entitled "To Help You Maintain Better Highways" features new self-propelled unit and illustrates time and labor-saving methods of removing and salvaging surplus materials on highway maintenance and construction through use of this machine. List of specifications.

★ ★ ★

VALVE STEM AND SEAT PROTECTION—**Amalie** Div., **L. Sonneborn Sons, Inc.**, 88 Lexington Ave., **New York 16, N. Y. (8 pp., illustrated.) How to safeguard upper valve stems and valve seats against excessive accumulation of carbon and pre**vent scoring due to dry cylinder walls, pistons and rings is pictorially explained in this **new** booket entitled "4 Ways to Give Your Engine a Lift." In it is discussed the **engine difficulties that may be encountered when corrosion, clogging and** gum formation attack carburetors, tanks, combustion chambers and valves. Pointing out that **reboring and new pistons mean new engine oper**ating conditions, publication explains how Gas-Lube **helps** shorten "breaking-in" time and **keeps** engine operating like a job just tuned up.

American

MATERIALS HANDLING FOR EVERY CONSTRUCTION JOB



HOISTS HOISTS ?

What size and type of hoist are you going to need to bring your materials handling equipment into line for the new construction work? A little, one-ton, single-drum hoist? A large, powerful, multiple-drum hoist for 250-ton derrick work and larger? Or a hoist somewhere in between? In this most complete line of hoists, there is a proved, AMERICAN Hoist for whatever your requirements in line pull, speed, type of power, and operating convenience.

Now is the time to look to your hoist requirements. Now is the time to see what the AMERICAN Hoists can do for you later.

4455

Plan now . . . but wait for **AMERICAN!**

AMERICAN MATERIALS HANDLING *for* EVERY INDUSTRY

AMERICAN HOIST & DERRICK CO.

Saint Paul 1, Minnesota

CHICAGO SAN FRANCISCO NEW YORK

Wherever wire rope is fastened . . . . use genuine **CROSBY CLIPS** *with the Red-U Bolt*

A Griffin Wellpoint Job

←BEFORE . . . A QUAGMIRE
18 ft. of water—saturated silt!

NOTE GRIFFIN WELLPOINT LINE

Before . . . A Quagmire (see above)

AFTER . . . DRY AND FIRM GRIFFIN GETS RESULTS

In the lower photo note that the crane mats were put aside after the Griffin Wellpoint System had stabilized the subgrade. Crane works right on bottom 19 feet below original water level. Steel Sheeting was eliminated except where specified at the existing structure.

ALL OTHER BANKS SLOPED—A REAL SAVING

RESULTS COUNT—WHY SAY MORE

●

For Sale and for Rent

MID-WEST

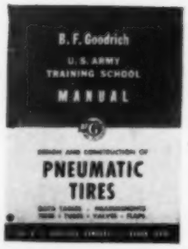
GRIFFIN EQUIPMENT CO., INC.
548 Indiana Street • Hammond 1662
HAMMOND, INDIANA

SOUTH

GRIFFIN ENGINEERING CORP.
633 N. Myrtle Ave. • Jacksonville 5-4516
JACKSONVILLE, 4, FLA.

MAIN OFFICE: 881 EAST 141st STREET, NEW YORK 54, N. Y.

GRIFFIN WELLPOINT CORPORATION



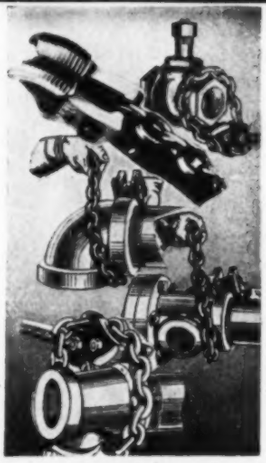
PNEUMATIC TIRES—**The B. F. Goodrich Co.**, Akron, Ohio. (50 pp., illustrated.) Comprehensive manual on design and construction of pneumatic tires has been published for United States Army training schools and is now available to civilians interested in the subject. Copies may be obtained upon request to the principal headquarters of the company in Akron. Publication discusses basic principles of pneumatic tire design, including pictured descriptions of the role which each part of the tire plays in its operations and how tires are manufactured. Measurements and other information on each of the important classifications of heavy-duty military and civilian tires and proposed load and inflation table for them are one of the features of the manual, together with tube, valve, flap and rim data.

★ ★ ★

VICTORY BINDER—**Aetna Plywood & Veneer**, 1731 Elston Ave., Chicago 22, Ill. Convenient method of filing, for ready reference, stock and price lists, news bulletins and informational service material sent out by this company from time to time and which will be forwarded at regular intervals. First section consists of complete picture story of the operations of Aetna office and warehouse at Chicago as typical of a large distributor's procedure. Second section, now in preparation, consists of twenty pages entitled, "The Function of the Plywood Distributor."

Look for the Arm-and-Hammer

ARMSTRONG BROS.



IDEAL CHAIN TONGS

For Pipe, Fittings and Flanges

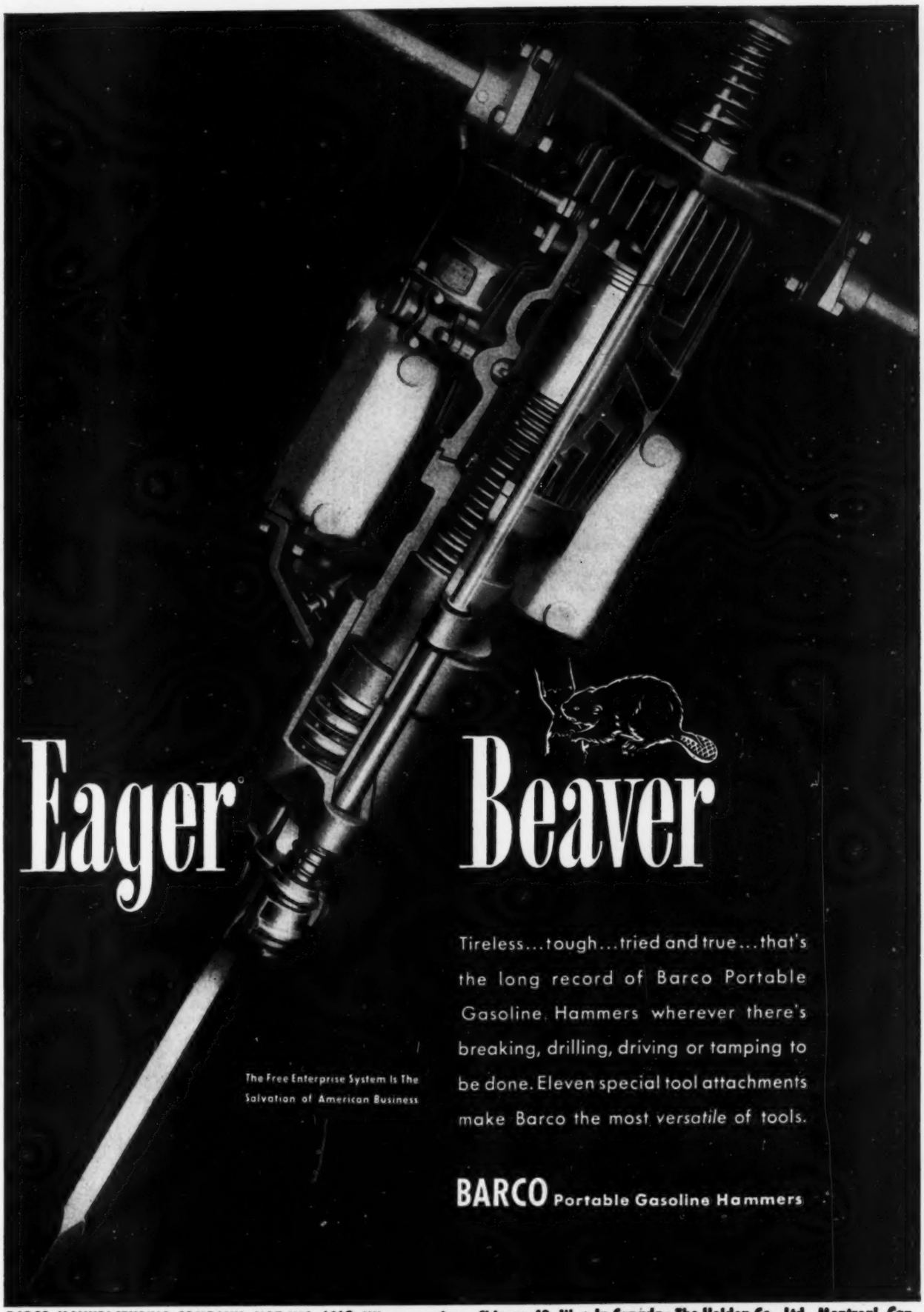
The JAWS have straight teeth for pipe, and V shaped teeth for fittings. Drop-forged from special high carbon steel carefully milled, heat-treated and hardened for toughness and lasting qualities.

The HANDLES are forged from spring steel heat-treated to give the required stiffness.

The CHAINS are proof-tested.

Write for catalog C-39a for complete showing and description Armstrong Bros. Pipe Tools.

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
334 N. FRANCISCO AVE. CHICAGO, U. S. A.
Eastern Warehouse & Sales, 199 Lafayette St., New York


Eager Beaver
Tireless...tough...tried and true...that's the long record of Barco Portable Gasoline Hammers wherever there's breaking, drilling, driving or tamping to be done. Eleven special tool attachments make Barco the most *versatile* of tools.
BARCO Portable Gasoline Hammers
The Free Enterprise System Is The Salvation of American Business

BARCO MANUFACTURING COMPANY, NOT INC., 1812 Winnemac Ave., Chicago 40, Ill. • In Canada: The Holden Co., Ltd., Montreal, Can.

So long as the enemy resists.....

the Byers shovel we'd like to ship you is helping break down that resistance for you.

When the war is won, Byers will offer you, new, improved, faster mobile cranes and shovels for peacetime jobs.

BYERS CRANES AND SHOVELS RAVENNA, OHIO
DISTRIBUTORS THROUGHOUT THE WORLD

JACKSON
FLEXIBLE SHAFT
VIBRATORS

. . . are the choice of those who want JACKSON standards of quality, dependability and performance. No other flexible shaft vibrator can offer such assurance.

Supplied with a 2⅜" and a 1¾" head. These two heads give user a vibrator efficient in and suitable for a wide range of applications. For instance, from wall sections of comparatively large size to narrow sections.

Model FS-6A, illustrated above, is furnished complete with 7, 14, 21 or 28 feet of shaft. Has dirt-proof turntable base. Supplied with or without wheelbarrow mounting.

Write, wire or telephone for further information

ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON, MICHIGAN

War-Made Invasion Ports

(Continued from page 53)

to assembly parks in the United Kingdom, for the actual sinking of the caissons in the artificial harbor and for the construction of the piers in the harbor.

It was a British responsibility to provide and deliver all the equipment necessary at the far shore for both harbors. The construction of the American harbor was the responsibility of the U. S. Navy, while that of the British harbor was combined Royal Navy and Army.

The arrangement of the breakwater on the ground was based on old French charts which were thought to be unreliable, owing to changes in the sea bed. These were corrected to some extent by actual reconnaissance and soundings taken during the period before D-day, but the plans had to be left very flexible, the final siting being dependent on surveys to be made as soon as possible on D-day.

Design for Piers

So far mention has been made only of the breakwater equipment; but, in order to form the port, internal equipment such as piers was highly desirable. Fortunately, the design and production of such equipment was well in hand. It is no easy matter to produce a pier hundreds of feet long, on a flat beach with the rise and fall of a tide of more than 20 ft., which may sometimes be floating and, at other times, be resting on the sand, or, worse still, on rock. This problem had been under examinaton since early in the war without any definite result, but in 1942 the Prime Minister took a personal interest in this subject.

He wrote:

"The piers for use on the beaches—they must float up and down with the tide. The anchor problem must be mastered. Let me have the best solution worked out. Don't argue the matter. The difficulties will argue for themselves."

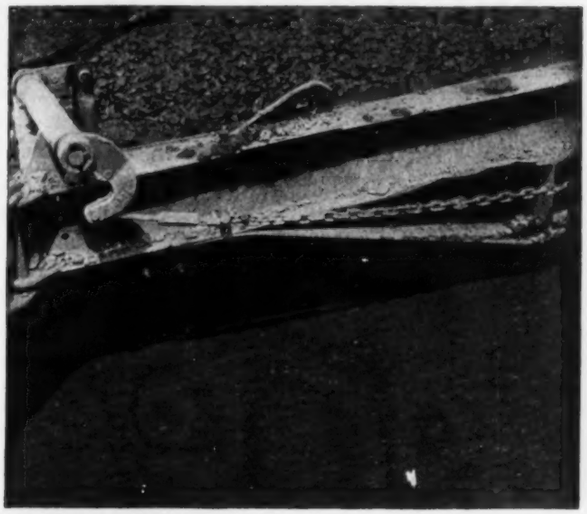
The result was that by early 1943, the prototype for the pier had been constructed. During the years 1943-44 it

(Continued on page 134)

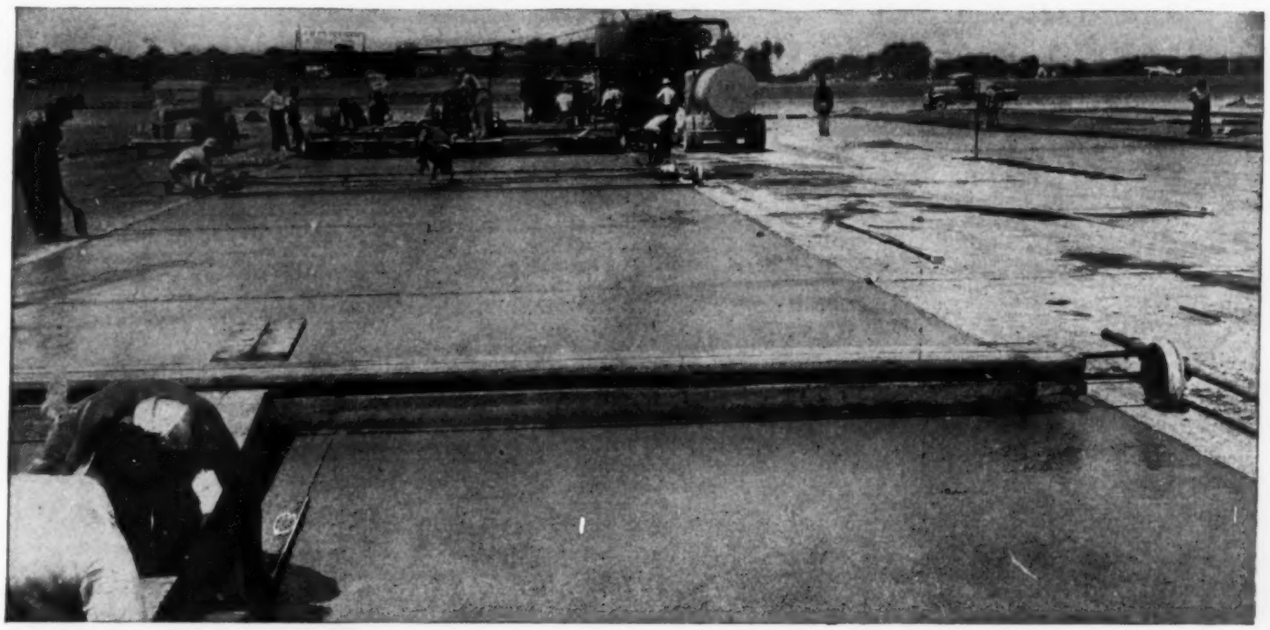
Paving at an Army Airport...

PICTURES ILLUSTRATE THREE ADVANTAGES OF ATLAS DURAPLASTIC*
THE AIR-ENTRAINING CEMENT ORIGINATED AND DEVELOPED BY UNIVERSAL ATLAS

FREEDOM FROM SEGREGATION of concrete made with Duraplastic cement shown by steep rounded edges of concrete just after dumping from paver bucket.



PLASTICITY: Concrete after first and only pass of finishing machine indicates plasticity imparted by Duraplastic cement.



ABSENCE OF BLEEDING or "water-gain" of Duraplastic concrete permits completing all finishing operations closer to paver. This is especially important when concreting is stopped at end of a day's run.

ATLAS DURAPLASTIC

Air-Entraining Portland Cement

A Universal Atlas Product

CM-D-10

**Trade Mark Registered, U. A C. Co.; all rights reserved.*

They Cut the WASTE TIME *out of Tunnel Driving...*

Speeding up tunnel jobs is a specialty of Gardner-Denver's Continuous Feed Drifting Drills. These drifters are *fast*. They help drill out the rounds in the shortest possible time. Drill runners prefer them, for they're remarkably easy to handle . . . vibration is "smothered" by the built-in feed motor . . . recoil is minimized.

That's why on practically all major tunnel jobs, Gardner-Denver Drifters played such an important part. Here are a few examples:

Delaware Aqueduct.....37.7% of headings

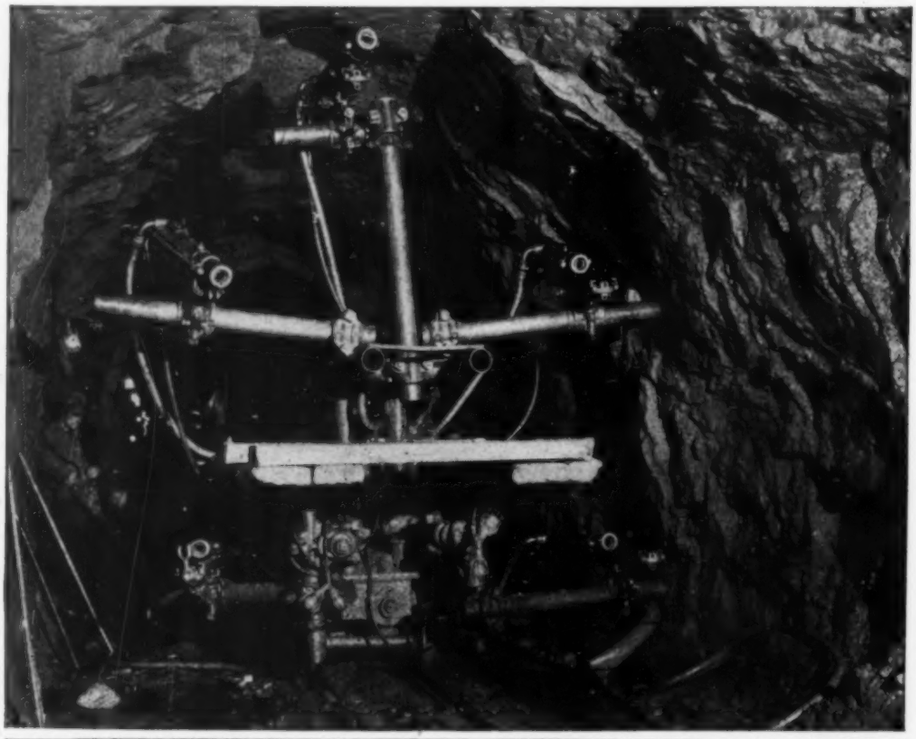
Shasta Dam.....69% of headings

Boston Water Tunnel.....50% of headings

Coulee Dam (Penstock Tunnels)...100% of headings

Roza Tunnel.....100% of headings

Stanislaus Tunnel.....100% of headings



Note These Gardner-Denver Advantages

1. **Convenient controls—always within easy reach of drill runner.**
2. **Far less wear—slow motion piston of feed motor makes only 2½ strokes per inch drilled.**
3. **Higher drilling efficiency—drill is always held in proper relation to the shank.**
4. **No nursing of feed to keep it from crowding.**

For complete information on Gardner-Denver Drifters, write Gardner-Denver Company, Quincy, Illinois.

3½-Inch CF89H Continuous Feed Drifter
4-Inch AF99 Continuous Feed Drifter
USE COMPRESSED AIR FOR Safety Convenience Flexibility
GARDNER-DENVER
Since 1859

THESE SLINGS PASS WARTIME INSPECTION

FOR SAFETY...SPEED...ECONOMY OF MANPOWER AND MATERIALS

When virtually every load is tagged for war production, efficient handling becomes an obligation—one you'll discharge on all counts with Yellow Strand Braided Wire Rope Slings.* *Safety?* The strength of this patented sling lies in tough Yellow Strand Wire Rope, so braided that it gains marked flexibility . . . conforms readily to any product . . . grips it gently but securely. *Speed?* Light weight and high kink-resistance make the sling easy to carry, attach and remove. *Economy?* A compact braided sling conserves manpower and materials, compared with bulky types. Even when lifting heavy locomotives, turbines, pressure towers or weapons, a Yellow Strand Braided Sling will require fewer men —and less steel. And for such lighter lifts as jigs, tools, drums or crates, a Yellow Strand Sling offers relief from the fiber shortage. Fitting material-handling equipment to your specific job is the function of Broderick & Bascom's specialized Sling Engineers. Investigate today!

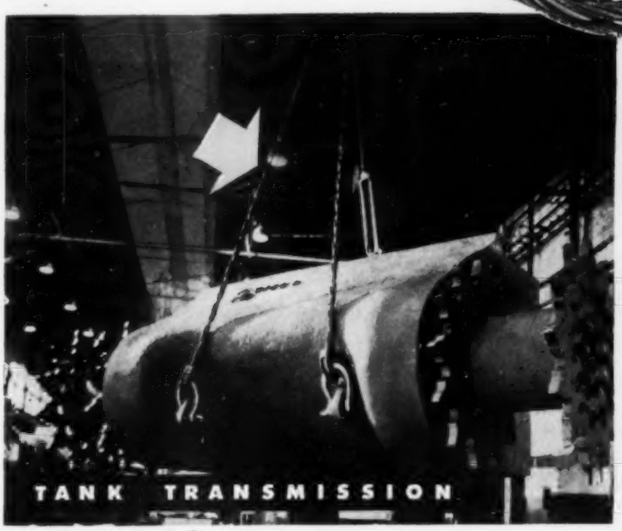
Broderick & Bascom Rope Co., St. Louis

Branches: New York, Chicago, Houston, Portland, Seattle
Factories: St. Louis, Seattle, Peoria

FREE

Riggers' Hand Book

96-pages of practical wire rope sling information. Send for free copy.



*Patents: U. S., 1475859, 1524671, 2142641, 2142642, 2299568 • Canadian, 252974, 258068

BRODERICK & BASCOM

YELLOW STRAND

Braided Wire Rope SAFETY SLINGS

"TRIPLE THREAT"

. . . AND THEN SOME!

THE football star who can run, pass and kick with equal ability is familiarly known as a "triple threat" man — and usually gets the "most-valuable-player" vote.

"Caterpillar" Diesel Tractors are even more versatile. They're "*multiple* threat" performers that can come through with a good job on any of a score of assignments. In fact, there isn't another type of mobile power unit that can rip, push, drag, haul, scrape, lift, load, run rotating machinery with such ready *adaptability, thoroughness* and *low over-all cost.* And because versatile "Caterpillar" Diesels can do so many things, they can "stay in the game"— get in a greater number of useful working hours and have fewer wasteful idle hours.

While your particular jobs may not call for all the things "Caterpillar" Diesels can do, it is well to remember the many kinds of equipment these rugged, dependable tractors can operate, and are operating throughout every field (to say nothing of the countless services they are rendering on the war fronts):

Bulldozer • Pushdozer • Scraper • Ripper
Wagon • Winch • Side Boom • Crane
Shovel • Loader • Logging Arch

Versatility and dependability! These give "Caterpillar" Diesels the ability to keep gainfully employed—provide faster, steadier profits for their owners. Keep this in mind when let-down in war needs enables you to "rearm for the industrial battle of peace."

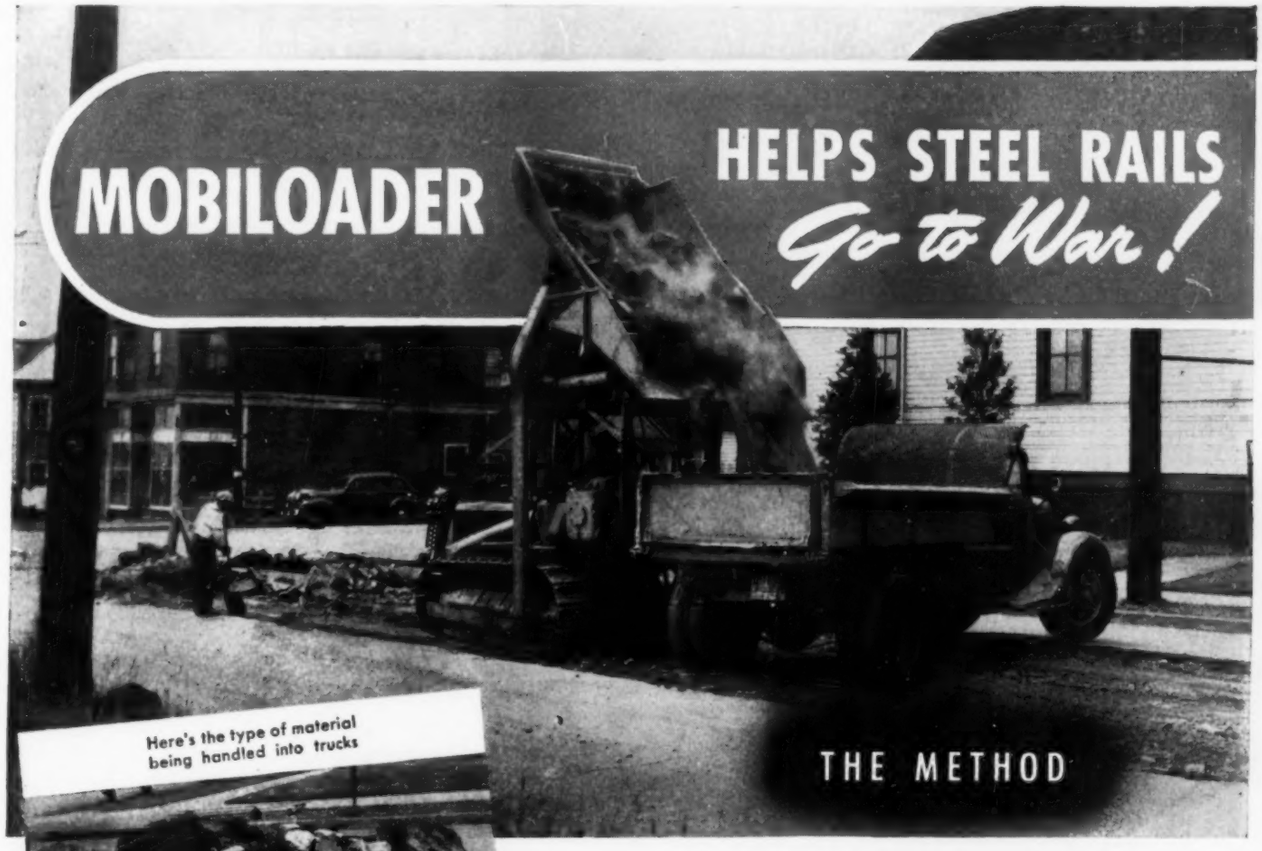
CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

CATERPILLAR DIESEL

Reg. U.S. Pat. Off.

ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

MOBILOADER HELPS STEEL RAILS *Go to War!*



Removing asphalt and bricks from streetcar right-of-way in Seattle after salvage of steel rails. Athey MobiLoader does the job of loading trucks--makes fast work of it!

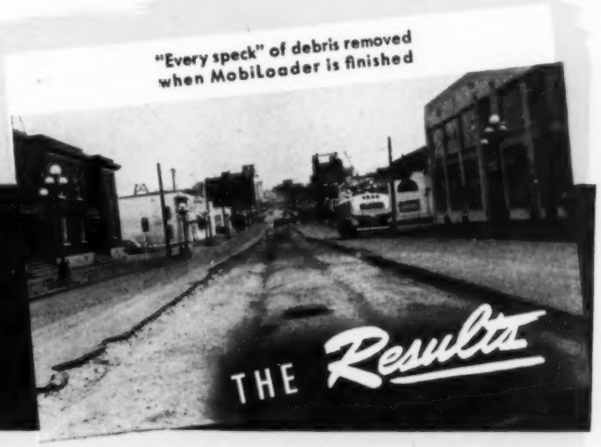
When the Northwest Construction Company of Seattle tackled their big contract to remove miles of steel rails from city streets, they turned over the important job of cleaning up debris from street surfaces to their Athey MobiLoader with exceptionally good results.

As the specially-designed rail-removing rig ripped up the salvaged steel for America's war machines, the Athey MobiLoader followed behind and loaded giant-sized asphalt slabs and pavement bricks from the right-of-way into trucks. The heavy material was hauled away at a fast clip and the clean strip, shown below, was all ready for the repaving crew to go to work.

The Athey MobiLoader, mounted on a "Caterpillar" Diesel Tractor, uses the simple overhead method of loading—travels forward to pick up, or dig, its load, goes in reverse to the truck or fill and discharges the material overhead. It's a fast, simple and highly useful mobile loading unit.

Used on a variety of stockpile and other loading jobs, it's speeding up production, replacing heavier, more expensive loading equipment and cutting loading costs.

Your Athey-"Caterpillar" Dealer can supply any data you may wish pertaining to Athey MobiLoaders. He can also take excellent care of your equipment parts and repair needs. Athey Truss Wheel Co., 5631 W. 65th St., Chicago 38, Illinois.



Athey ★ MOBILOADERS

More Speed for every service operation . . . Snap-ons deliver it . . . with less effort, greater accuracy and utmost safety! Throughout the construction industry, Snap-on tools are helping keep irreplaceable equipment on rigid wartime schedules. The Snap-on line covers the broadest range of service requirements, from smallest service tools to Extra Heavy Duty and Jumbo wrench sets. Snap-on's direct-to-user tool service is conveniently available through factory branches located in 37 principal cities.
Snap-on Tools
THE CHOICE OF BETTER MECHANICS
SNAP-ON TOOLS CORPORATION, 8054-L 28th Ave., Kenosha, Wis.

(Continued from page 128)

stood up well to severe tests, so it was possible to go into production, the total requirement being 7 mi. of pier with all the necessary appurtenances.

The Task up to D-Day

This was a race for time, the main undertakings being:

(1) The construction of the concrete caissons under Ministry of Supply arrangements.

(2) The prefabrication of the pier equipment and its assembly into towing pieces.

(3) Construction of the floating breakwaters.

(4) Preparation of the blockships so they could be sunk easily and rapidly on an even keel.

These four requirements in themselves were an enormous task in the time available without taking into consideration other tasks, such as:

(1) Towing caissons, floating breakwaters and pier equipment from construction sites to assembly parks. In all, this amounted to 500 tows, some from ports as distant as Leith or Glasgow to the south coast.

(2) Servicing and general preparation of the tug fleet for sea.

(3) Forming up and training the staffs and personnel of the Royal Navy, U. S. Navy and Royal Engineers to carry out the operation.

The time was, in fact, inadequate to complete this program, but the essential equipment, with a suitable proportion of reserve, was assembled and ready to go on the right date, although the personnel had not been able to complete a full program of training.

The Operation

The first arrivals on the far shore were blockships, all of which, in spite of their age, made the crossing close behind the assault forces and arrived safely. They were sunk by explosive charges, and their Naval and Merchant Navy crews were then brought back to the United Kingdom. The whole of this part of the operation was completed successfully during the five days following D-day, and provided some very valuable shelter on the beaches during this critical period.

Meanwhile, the concrete caissons, floating breakwaters and piers were being towed across at an average speed of 4 knots, the total distance being more than 100 mi. All the pieces towed very well

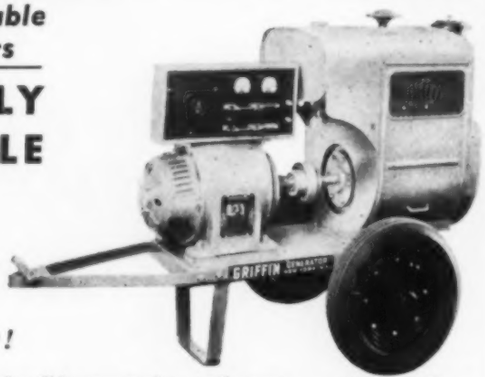
(Continued on page 136)

Nitro Starch Base
HIGH EXPLOSIVE EFFICIENCY
IN MINING · QUARRYING · LOGGING · CONSTRUCTION
PLUS THREE ADVANTAGES FOR YOU!
• America's fists are swinging with ever-increasing power. We are proud that Trojan Explosives are helping our fighters shorten the road to Victory. But, we shall be grateful, indeed, when the power of Trojan again can be turned fully to its intended purposes of building and development.
BUY BONDS!
• WILL NOT PRODUCE HEADACHES from handling . . . reduces discomfort from breathing muck pile fumes. Better working conditions for you and your men!
• WILL NOT FREEZE or leak at Arctic or Tropic temperatures. Maintained high efficiency . . . anywhere anytime!
• WITHSTANDS IMPACT in high-powered Rifle Bullet Test. Greater safety for workers!
EXPLOSIVES 1905 TROJAN 1944 CHEMICALS
POWDER COMPANY
ONE OF AMERICA'S OLDEST HIGH EXPLOSIVES MANUFACTURERS
PLANTS: SEIPLE, PA. • ROBERT, CAL. • MAGAZINES STRATEGICALLY LOCATED THROUGHOUT THE NATION
OFFICES: ALLENTOWN, PA. • SAN FRANCISCO, CAL. • LOS ANGELES, CAL. • PORTLAND, ORE. • NEW YORK, N.Y.

One of the Dependable Griffin Generators

THOROUGHLY DEPENDABLE POWER and LIGHT

anywhere you want it!



Gasoline engine is a standard well-known make; easily serviced; rugged; simple. Coupling is all-steel, running in a bath of oil. Generator is two-bearing, designed to take periodic overloads without damage. Two men can handle *anywhere* . . . one man, on a normally level surface. No gadgets to fool with. Just start the engine and plug in! Capacity 5 to 7½ K.W. If your job requires the operation of electric tools and motors or lighting, as, when, and where needed—here is your most economical equipment. It's one of the dependable Griffin products! Call or write for details.

Engineered and built to give you the same dependable Long Life as all Griffin products.

MODEL 5-DR
Steel tired wheels during the rubber shortage

For Sale and For Rent Call Nearest Address

MID-WEST
GRIFFIN EQUIPMENT CO., INC.
548 Indiana Street • Hammond 1662
HAMMOND, INDIANA

SOUTH
GRIFFIN ENGINEERING CORP.
633 N. Myrtle Ave. • Jacksonville 5-4516
JACKSONVILLE, 4, FLA.

MAIN OFFICE: 881 EAST 141st STREET, NEW YORK 54, N. Y.
GRIFFIN EQUIPMENT CORPORATION

The Jenny Is A "Husky" That Gets Things Done!

Simplex Jenny Center-Hole Hydraulic Puller removing a crawler tractor axle. Five models; capacities 30 to 100-tons.

No matter how tough the pulling, pushing or lifting job, the Simplex Jenny gets it done in minutes instead of hours. "Impossible" tasks in the construction field are all in the day's work for this powerful hydraulic unit. The Center-Hole makes the Jenny a great saver of manpower when pulling bushings, cylinder liners, pistons, wrist pins, valve seats, keys, wheels, gears, sprockets, cable, etc. Alloy rod can be tack-welded to parts to be pulled, passed through center-hole in Jenny and bolted or fastened above the ram. Ruggedly built of heat-treated alloy steels. Send for Bulletin No. 43-J.

Simplex
LEVER · SCREW · HYDRAULIC
Jacks

Templeton, Kenly & Co., Chicago (44), Ill.
Better, Safer Jacks Since 1899

(Continued from page 134)

in spite of their awkward shapes, except for the length of pier, which had to be treated very tenderly in the choppy weather experienced.

The total tug fleet available for towing the equipment was 85 vessels, varying from very large U. S. tugs of more than 1,500 hp., to small tugs of 600 hp., not generally used in the open sea. A minimum of 210 tows was required, involving a weight of over 1,000,000 tons, allowing for a few losses by enemy action, and each round trip was expected to take three days. Luckily there were very few losses of tugs, and they carried out this unusual, strenuous and sometimes dangerous task with great patience, courage and skill.

On arrival, the concrete caissons had to be sunk accurately in places selected as a result of surveys made by a special party landed on D-day. In spite of the difficulty of picking the exact spot, the operation was carried out successfully, very few caissons being out of alignment. By D-day plus 12 more than half the caissons were in position, and the harbors were already an impressive sight.

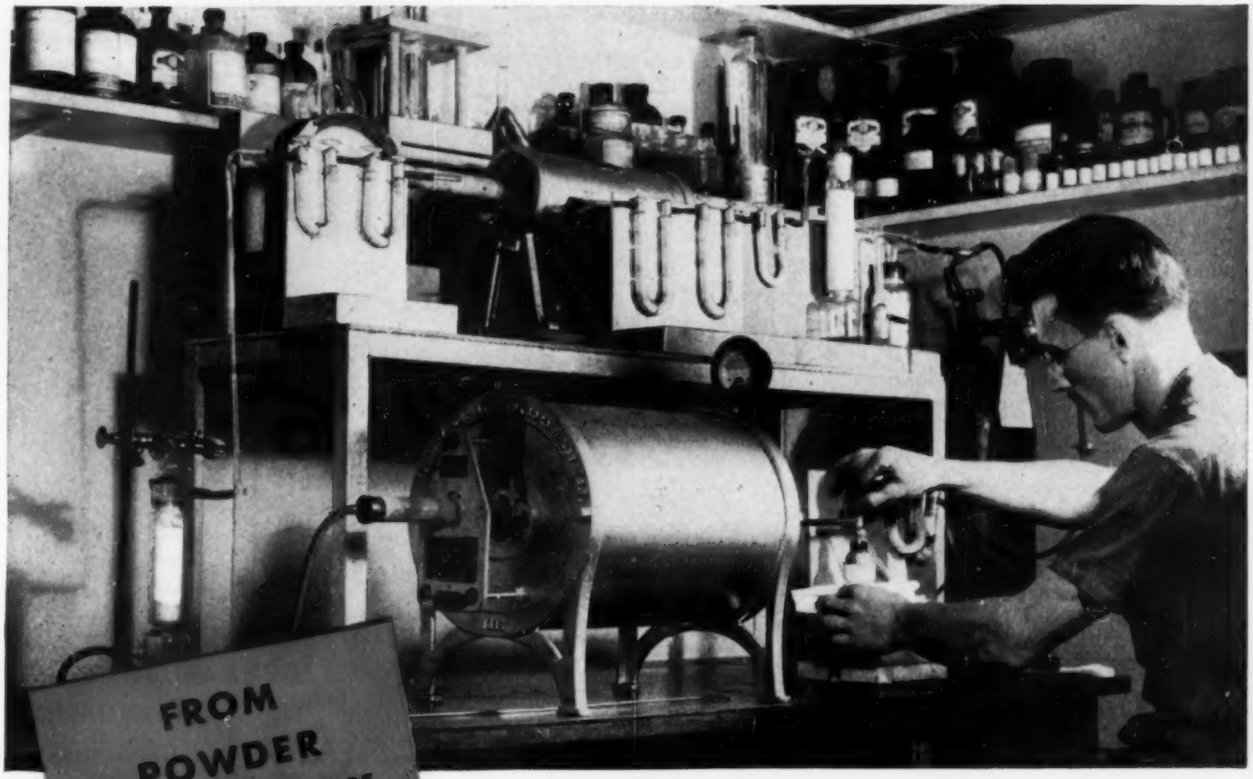
Similarly, advanced parties in special ships arriving on D-day had laid heavy moorings in deep water, to which the floating breakwaters were attached as they arrived. This operation was completed by D-day plus 8.

Meanwhile, port parties of Royal Engineers—or of Seabees in the American harbors—landed on D-day, had cleared mines, cut ramps in the esplanades and prepared roadways down to the beaches ready to receive the shore ends of the piers. The port party also included a naval beach commando, and detachment from the Royal Marines. In the setting down of the harbor the Navy and the Army worked hand in hand — soldiers were sailors and sailors were soldiers and Royal Marines were both. This operation was half finished by D-day plus 12, by which time one pier hundreds of yards long with several pier heads, was complete, and coasters could be unloaded at any state of the tide.

Ga) Causes Damage

Up to D-day plus 12, therefore, the operation had gone according to plan, very few accidents of the sea had occurred, and air superiority was such that enemy interference had caused little trouble. But on D-day plus 13, a gale blew up from the northeast which continued for three days—the worst June gale experienced for 40 yr. Moreover, it came from the worst possible direction as the harbors were exposed to its full force. Unfortunately it caught the harbors at the half-way stage. The American harbor suffered most severely as it

(Continued on page 138)



This unique apparatus, developed in The S. K. Wellman Company laboratories, measures minute quantities of oxygen in powder metal formulas.

FROM POWDER METALLURGY HEADQUARTERS

. . . come better friction materials

● In the world's largest laboratory devoted to friction materials, we are constantly finding ways to produce *better* clutch facings and brake linings. That's why Velvetouch has established so many enviable records for long wear and smooth operation in all types of earth-moving equipment. If you have not recently used Velvetouch, specify this all-metal friction material for your next brake or clutch overhaul.

THE S. K. WELLMAN COMPANY
1374 EAST 51st STREET • CLEVELAND 3, OHIO

Velvetouch is *all metal*—a combination of powdered metals, compressed, sintered and welded to a solid steel backing.

For Brake and Clutch . . . Use Velvetouch

The "INSIDE STORY" of POWDER METALLURGY

CHAPTER II. For maximum strength and heat conductivity, the powdered metal friction materials are firmly bonded to steel backing plates. Photo above shows steel "cores" being stamped out for Velvetouch facings.

(Continued from page 136)

was in a more exposed site, and the breakwaters were largely broken up, so much so that this, combined with the capture of Cherbourg, caused work on this harbor to be discontinued. The British harbor was protected to some extent by the Calvados Reef and suffered far less damage, from which it was soon able to recover and be completed.

The gale took a heavy toll of shipping and craft, but this was largely damage rather than dead loss, except in the case of the experimental floating breakwater, which broke up and ceased to give protection. The shelter provided by both harbors and the three additional block ship shelters, which stood up well in the gale, undoubtedly saved great loss of life and equipment. Unloading on the beaches elsewhere was quite impossible, but during this critical period a small but important trickle of stores could be landed in the harbor. Even on the worst day 800 tons of gasoline and ammunition, as well as many troops, were landed over the piers.

Port Completed

All the pier equipment which was on the voyage across when the gale started was sunk, but only one concrete caisson failed to weather the journey. After the gale subsided, the work of construction continued as before, though a long spell of rough water prevented pier equipment from being towed over, so that the harbor was not unloading to maximum capacity until well into July. Finally, however, it was complete, and a port bigger than many with famous names had been built in a few weeks against a lonely French beach.

Day after day, in all weathers, scores of ships of all sizes have moored within its shelter or berthed in unbroken lines alongside its quays. Never, even at the height of a peace-time trade boom, has so much shipping used such limited accommodation at one time. Many thousands of British workmen were directly concerned with its making and scores of thousands more were indirectly employed. As a result of their craftsmanship, hundreds of thousands of tons of vital supplies, scores of thousands of men and many thousands of vehicles have been put ashore in the most rapid military build-up ever undertaken.

The prefabricated port made possible the liberation of western Europe.

Concrete Caissons

The caissons, sunk to form breakwaters, were made in six different sizes to suit various depths of water up to 5½

(Continued on page 140)

COFFING HOISTS

"Safety-Pull" Hoist Pulling Concrete Forms

"Quik-Lift" Electric Hoist Speedily Moving Pipe

Model "YC" Spur Geared Hoist Moving Large Truck Motor

Write Today for Catalog DG 6

FOR SPEED
SAFETY
ECONOMY
DURABILITY

IN PRACTICALLY ALL LINES OF INDUSTRY COFFING HOISTS ARE PLAYING A PROMINENT PART IN SPEEDING UP
CONSTRUCTION
PRODUCTION
MAINTENANCE

COFFING HOIST COMPANY
Danville, Illinois, U. S. A.

IMPROVED
JOHNSON
All-Welded
BUCKETS

DURABLE
STREAMLINED
ECONOMICAL

• Users everywhere are realizing the many profitable advantages of the Johnson Clamshell Bucket, the bucket that combines clean, fast digging with full protection against wear.

All-welded construction eliminates rivets, bolts, and other impeding projections, assuring best balance and better digging quality in all kinds of material.

Renewable lip edge-bar of tough manganese steel combats wear and is easily replaceable in the field.

Needle-bearing mounted closing sheaves permit free-running cable action at all times, bearings are sealed against entrance of dirt and moisture.

Lower sheaves are fully protected by heavy rugged steel plates. All sheaves have large diameter for increased cable life.

General purpose type, 1/2 to 1-1/2 yards capacity in stock for immediate delivery.

Johnson Bucket in open position showing heavy shock-preventing protection plate for lower sheave assembly.

Johnson Clamshell Bucket showing manganese steel teeth designed for smooth speedy digging.

Write today for full information.

The C. S. Johnson Company
Champaign, Illinois

LESS GEAR "SCUFFING"

-FEWER "TIME-OUTS" FOR REPAIRS!

ISN'T THAT YOUR AIM? Mobilube Gear Oils help save manpower—reduce "out-of-service" time! They're highly stable, straight mineral oils, built especially for use in heavy-duty transmissions and axles...are free of abrasives, soaps, fillers or foreign materials of any kind...reduce "scuffing" and wear to a minimum—withstand long service!

OTHER SOCONY-VACUUM TIME-SAVERS:

DELVAC OILS—Recommended for all automotive-type Diesels and heavy-duty gasoline engines. Effectively minimize sludge deposits. Resist to an extreme degree formation of sludge and lacquer. Will not corrode hard-alloy bearings. Help engines operate at maximum efficiency with minimum maintenance.

MOBILUBE "V"—A special, short fiber, soda soap grease developed primarily for wheel bearings and grease-type universal joints, but also recommended for clutch release bearings and other parts operating at high temperatures. Remarkably efficient and long-lasting. Recommended for year-around use.

Talk with your Socony-Vacuum Representative

Mobilgas
SOCONY-VACUUM

USE SOCONY-VACUUM FUELS, LUBRICANTS, AND ENGINEERING SERVICE!

KEEP ENGINES "ON SCHEDULE" WITH SOCONY-VACUUM'S FAMOUS

MOBILUBE *Gear Oil*

SOCONY-VACUUM OIL CO., INC., and Affiliates: Magnolia Petroleum Co., General Petroleum Corp. of Calif.

DIGGING BUCKETS...with the heaviest digging bucket jaws in standard use...with closing ratios up to 7:1...do handle yardage faster, throughout each year of a long life.
Bucket, you sure dig a mouthful!
HAISS
HI-POWER
GEORGE HAISS MANUFACTURING CO. INC., 139th St. & Canal Place, New York 51, N. Y.
Bucket agencies throughout the country. Write, wire for prices, delivery and catalogs.

STERLINGS SPAN THE STATES!
If the millions of wheelbarrows produced by the Sterling Wheelbarrow Company were placed end to end, they would span the United States, coast to coast. Today, many of these sturdy Sterlings are in the service of Uncle Sam, wheeling vitally needed war materials . . . doing their part to help speed VICTORY.
STERLING WHEELBARROW CO., MILWAUKEE, WIS.
Look for this Mark of STERLING Quality
Sterling
WHEELBARROWS

(Continued from page 138)

fathoms. The largest size had a displacement of 6,044 tons, the smallest a displacement of 1,672 tons. When floating, the whole looked rather like a Noah's Ark without its roof, while, viewed from above, the cross walls made it look like an egg box, as there was no deck.

Each caisson contained crews' quarters for use during the passage, the crew being partly naval for handling the ship and partly from the Royal Engineers or Seabees for carrying out the operation of sinking.

At a late stage, Bofors guns, 20 tons of ammunition and rough shelters for a gun crew were placed on the top of most caissons as additional anti-aircraft protection of the harbor.

Caissons were towed empty across the Channel by one large tug (about 1,500 hp.). On arrival they were maneuvered into position with the help of small tugs, and then special valves were opened, allowing water to fill the shell and sink it in place. Valves were left open so that the water level remained the same inside and out. It took roughly 22 min. to sink the largest size caisson.

The numbers of concrete caissons produced in various sizes were 60 (largest), 11, 25, 23, 17 and 10 (smallest), a total of 146. Construction was carried out in 8 dry docks, 2 wet docks, 12 basins, and 4 slipways. The basins were holes excavated beside the Thames, in which the lower portion of the caisson could be built as in a dry-dock. A channel was then cut to the river and the caisson floated out to be completed in a wet dock berth. The wet dock berthing space required amounted to 12,000 ft.

Construction sites were mainly in the Thames and Southampton areas but outlying ones were as far distant as Birkenhead and Hartlepool. The Ministry of Supply employed many of the leading firms of consulting engineers to assist in the project, and the actual work was carried out by 25 large contracting firms.

The total labor force involved in the construction, which does not include the fabrication of many essential small parts, was about 20,000 men. This included 1,200 skilled fitters, 1,400 carpenters and 2,400 semi-skilled workers, all of whom had to be mobilized and moved to the right areas by the Ministry of Labor.

In all, it is estimated that the following main materials were used: 330,000 cu. yd. of concrete (nearly 500,000 tons; 31,000 tons of steel, 1,500,000 sq. yd. of shuttering (forms).

Floating Pier Equipment

The floating piers consisted of a single steel roadway, carried on steel girders similar in many respects to an ordinary bridge, but so designed that there was

such flexibility that the heaving and twisting effect of the sea could be withstood. Each bridge span was supported on special floats, some of steel, and others of concrete, also designed to withstand the sea and also to sit down on rock or sand when the tide receded. Sections of pier were joined by special means to give flexibility and to insure easy and rapid connecting up. There was no limit to the length of a pier, other than the depth of water for successful anchoring, but for towing, lengths of 480 ft. were joined.

At the shore end these piers were joined to a very stout steel shallow-draught float which could be pulled right inshore at high water. At the outer end, they were linked to specially designed spud pierheads. These consist of a steel pontoon with a displacement of approximately 1,000 tons. Each pierhead is a "ship," complete with crews' quarters, generating sets, and storage accommodation. Coasters berth alongside and unload direct into trucks on the pierheads.

Using the same pierhead, but with some extra fittings, it can be converted for use of LST's. A sort of false beach piece made of steel is provided, onto which the LST runs its bows and lowers its ramp. Vehicles can be discharged very rapidly by this means.

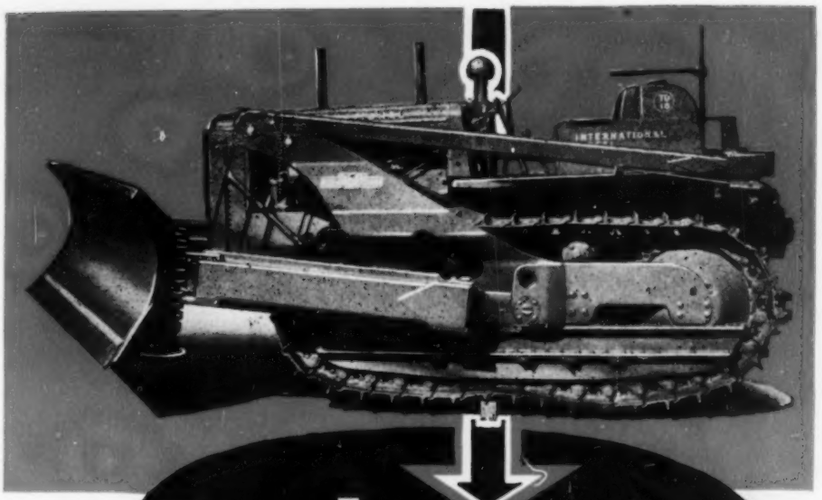
Pierheads were built as ships in various ports on the coast, from Leith round to Glasgow, four being built by the Royal Engineers at military ports in Scotland. Most of the remaining equipment was prefabricated all over the country and then assembled at Army depots at Southampton and Richborough. Some 240 contractors were employed on this task, so that it is impossible to estimate the labor force involved. In all, 50,000 tons of steel were used.

Floating Breakwater

The floating breakwater consisted of steel floats. These were moored end to end in a long line and were designed to have a damping effect on the sea in winds up to Force 5 which might be expected during the summer months.

By March two rows were completed and moored under constant observation off the south coast of England. From then until D-day, the weather was generally calm so that, although the breakwater gave great promise, no one could be certain how it would behave in really rough water.

Units were prefabricated, and then assembled at Southampton, where a labor force of 2,000 men was employed. It is difficult to estimate the number of men employed in other areas on prefabrication, but this is probably about 6,000. A total of 15,000 tons of steel was used in the construction of the floating breakwater units.



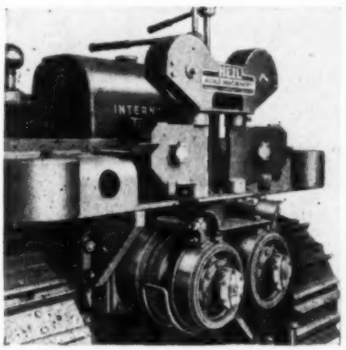
Balance

...assures ease of control and efficient operation

with the Heil Co.'s new

Cable Dozers

for International Harvester TracTracTors



Equipped with simple, fast-operating, troublefree Heil Cable Power Control Unit

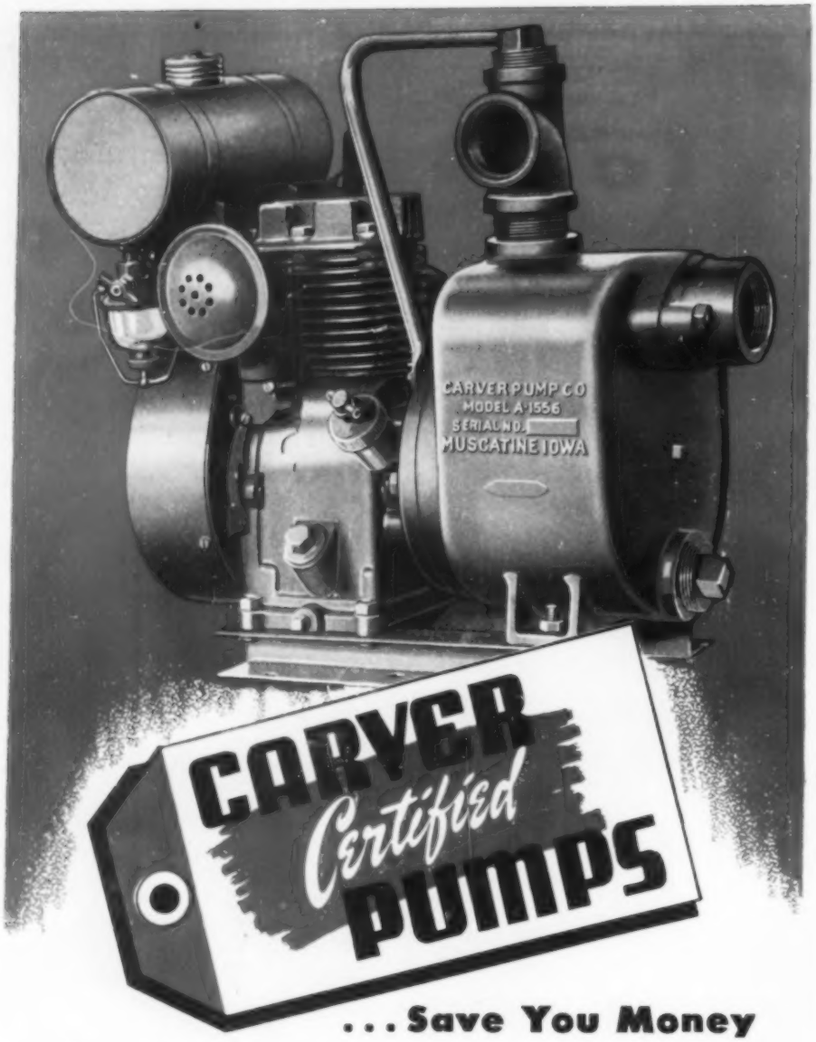
Ample safety factor. Smooth-operating brake and clutch assemblies that eliminate shocks and jerks. Large drums that run cool. Sheaves designed to reduce wear on cables.

The full power of your tractor drives on the blade — moving more "pay dirt" with each load — and there is no nosing down or rearing up, because the center of gravity has not been changed by the addition of the Cable Dozer. This is just one example of the thorough engineering which has accomplished perfect teamwork all along the line. Note operator's unobstructed view — convenience of controls (adjustable to his reach) — rugged side member construction. Send for bulletin describing many other features which assure you of cleaner, faster dirt moving at lower cost. R-19

SEE YOUR INTERNATIONAL TracTracTor Distributor

THE HEIL CO.

GENERAL OFFICES • MILWAUKEE 1, WISCONSIN



. . . Save You Money

LOW first cost, fast priming, efficient, non-clogging action mean that Carver Pumps get to work faster, stay on the job longer, and pump more water at less cost per gallon. Top capacity is maintained even after hundreds of hours of toughest service because the wearing surface seal rings are made of Tungsten Carbide that will keep water in and air out, for the life of the pump.

Every Carver Pump carries a "Certified" tag which means that it has been carefully tested and fully meets our high standards for performance on the job. It's your assurance of peak performance on your toughest jobs as well as on the easy ones. For details, see your nearby Carver distributor or write direct.

THE CARVER PUMP CO.
Muscatine, Iowa

CARVER CENTRIFUGAL
Certified PUMPS

Fontana Dam

(Continued from page 59)

hoppers by a hand-operated turnhead, and buckets on the trains are loaded from an air-operated gate in the bottom of each hopper.

Concrete transfer trains operate on all the trestles. Each train consists of a standard-gage heavy-duty flatcar drawn by a diesel locomotive. The car is fitted with pockets for carrying four loaded and one empty bucket. Three of the locomotives are mine-type diesel units, originally 36-in. gage, converted to standard gage. Four revolving 40-ton cranes and two hammerhead cranes with a total span from tip to tip of 300 ft. make up the concrete-placing equipment, with an additional 20-ton revolving crane added later to supplement these units.

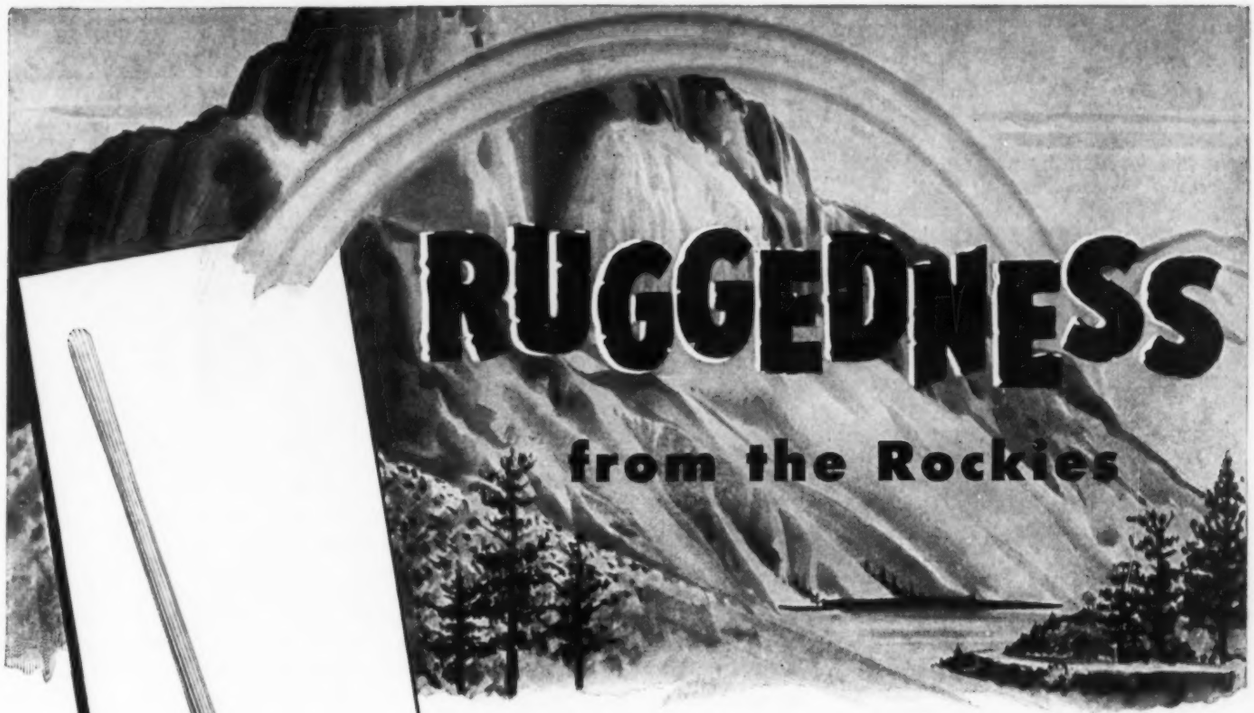
Concrete buckets are 4-cu. yd. bottom-dump, air-operated, self-closing type, designed and built by TVA. The bucket is dumped by inserting an air nozzle into a socket on the side of the bucket. The whole operation of opening, discharging, and reclosing requires only 2 sec. Thirty of these buckets were built on an improvised assembly line at TVA's machine shop at Fort Loudoun Dam. The speed with which they operate, compared to usual standard buckets, has been a time-saver on the project.

Another time-saving device was developed at Fontana by G. E. Murphey, construction superintendent, who designed a special box to hold all material such as cooling pipe, grout fittings, seals, and drain pipe required for a particular block of concrete. The material is assembled and placed in the box in advance. When the block is ready, the loaded box is lowered on to the monolith inside the forms for the use of the men preparing the block for concrete. When finished, all left-over items are put back in the box, together with all the refuse material and clean-up, and the box is returned to the assembly yard. The material boxes have saved much time by assuring in advance that all material would be available when needed.

Forms

Forms for the 5-ft. lifts at Fontana are a cantilever type developed on the project. The lagging consists of two layers of 1 5/16-in. t.&g. lumber, supported on three horizontal 6x6-in. wales, which in turn are carried on vertical cantilever beams, on 4-ft. centers, each made up of two 4x12-in. timbers. The panels are fastened to the concrete by 1-in.-dia. bolts which screw into ty-loops embed-

(Continued on page 144)



Illustrated: Moly Closed-Back Shovel with Steel I-Beam Handle Reinforcement

MAKES WOOD'S Moly REG. U.S. PAT. OFF. SHOVELS

OUTWEAR ALL OTHERS!

Magic Mo-lyb-den-um, the miracle mineral mined in the Colorado Rockies, gives Moly Shovels, Spades and Scoops a rugged toughness that even outwears that of the granite peaks among which Mo-lyb-den-um is found.

Moly Shovels, Spades and Scoops, with blades of Mo-lyb-den-um alloy steel made to Wood's own special analysis, have won world-wide reputation . . . have earned exclusive world rights to the name Moly.

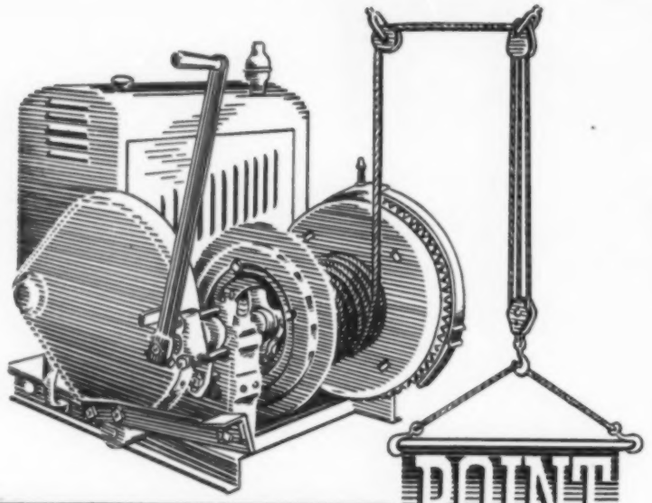
Buy these stronger, tougher shovels and watch your shovel costs go down, down and down. Moly means more wear . . . Moly shovels are unconditionally guaranteed to outlast, out-wear all others.

THE WOOD SHOVEL AND TOOL CO.
PIQUA, OHIO

A National Organization Specializing *Exclusively* in Shovels, Spades and Scoops.

Moly
REG. U.S. PAT. OFF.

MO-LYB-DEN-UM ALLOY SHOVELS



WE RAISE THIS POINT

Post-War Construction will be BIG . . . too big to be done by hand! The successful peacetime Contractor will be the man with the most modern Construction Machinery. Labor-saving equipment is money-making equipment.

A Novo Hoist will raise your prestige in the Construction Field . . . will raise your chances of getting the big jobs . . . will raise your profits from close bids. Novo Hoists are built to handle the job . . . and built to be easily handled. They are job-designed, field-proven, and have plenty of power. Novo's complete Line of Hoists ranges from 1,000 to 8,000 lb. capacity.

We Raise this POINT . . . YOU can be helped by a Novo Hoist.

To get complete information about Novo Hoists, simply "raise" your pen and "drop" us a line.

Diaphragm and Pressure Pumps

Generator Sets

Hoists

Self-Priming Pumps

Pavement Breakers

Engines

Also a member of A.E.D.

NOVO ENGINE COMPANY LANSING 5, MICHIGAN

NOVO ENGINE COMPANY, 214 Porter Street, Lansing 5, Michigan

Send me complete information on the following types of Novo Hoists.

Contractor_____ Drag Line_____ Mining_____ Fertilizer_____

NAME _____

ADDRESS _____

(Continued from page 142)

ded in the concrete. Panels were made in 16-ft. and 18-ft. sections, and a scaffold was provided near the bottom of each panel for the workmen who adjust the bolts and align the forms. The forms are raised with steel A-frames and hand winches.

Cement Handling

Cement is delivered by rail in bulk. An unloading plant capable of handling six cars at one time is located upstream. The cars are unloaded by manually-operated power scrapers dumping into hoppers from which the cement is carried by inclosed chain-flight conveyors to three surge tanks above three air-activated cement blowers. Cement is screened before entering the hoppers. The three air conveyors transport the cement through a 6-in. pipe line about 3,000 ft. long, including a 300-ft. lift, to four 6,000-bbl. steel storage silos. From these silos, the cement is blown to the mixer plant bins by three more air-activated conveyors. The equipment handles about 9,500 bbl. of cement per day.

Concrete Cooling

As necessary for a dam in which a huge mass of concrete is to be placed on a fast schedule, much thought was given to controlling concrete temperature in order to prevent stresses and cracking in the concrete. At Fontana, both river water and refrigerated water are circulated through coils embedded in the concrete to prevent excessive heating as the cement sets and to cool the mass to its proper temperature. Coils of 1-in.-dia. pipe are placed in the bottom of each lift, with connections through the forms to the face of the dam. Two systems of headers, one of 6-in.-dia. pipe connected to the refrigeration plant and one of 8-in.-dia. pipe to a river-water pumping plant, are located on the upstream and downstream faces of the dam, each consisting of a feed line and return line. A set of risers and return pipes extends upward along the edge of every other block, with manifolds at each 5-ft. lift for hose connections to the coils in the concrete. In this way, hoses can be connected to either the river-water or the refrigerated system. Risers were made in 5-foot sections to permit them to be extended as concreting progressed. The river water pumping plant comprises three vertical pumps, 1,100-gpm. capacity at 250-ft. head, and the refrigeration plant consists of one 62-ton-capacity unit and one 193-ton-capacity unit. Refrigerated water is circulated by four horizontal centrifugal pumps, each 300 gpm. at 200-ft. head. In the winter, the river-water system is all that is re-

(Continued on page 146)

TYPICAL DIESEL LUBRICATION PROBLEMS:

5. Liner Wear

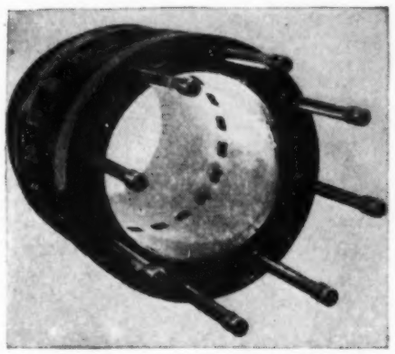
Wear on Diesel liners is commonly concentrated in the high-temperature belt near the combustion chamber. This is largely attributable to the inherent inability of most lubricating oils to "wet" hot metal surfaces.

Unlike spark ignition engines in which a partial vacuum in the combustion space during the intake stroke assists in drawing oil toward the upper compression rings, Diesels operate at or above atmospheric pressure in the combustion space which tends to drive oil away from the rings.

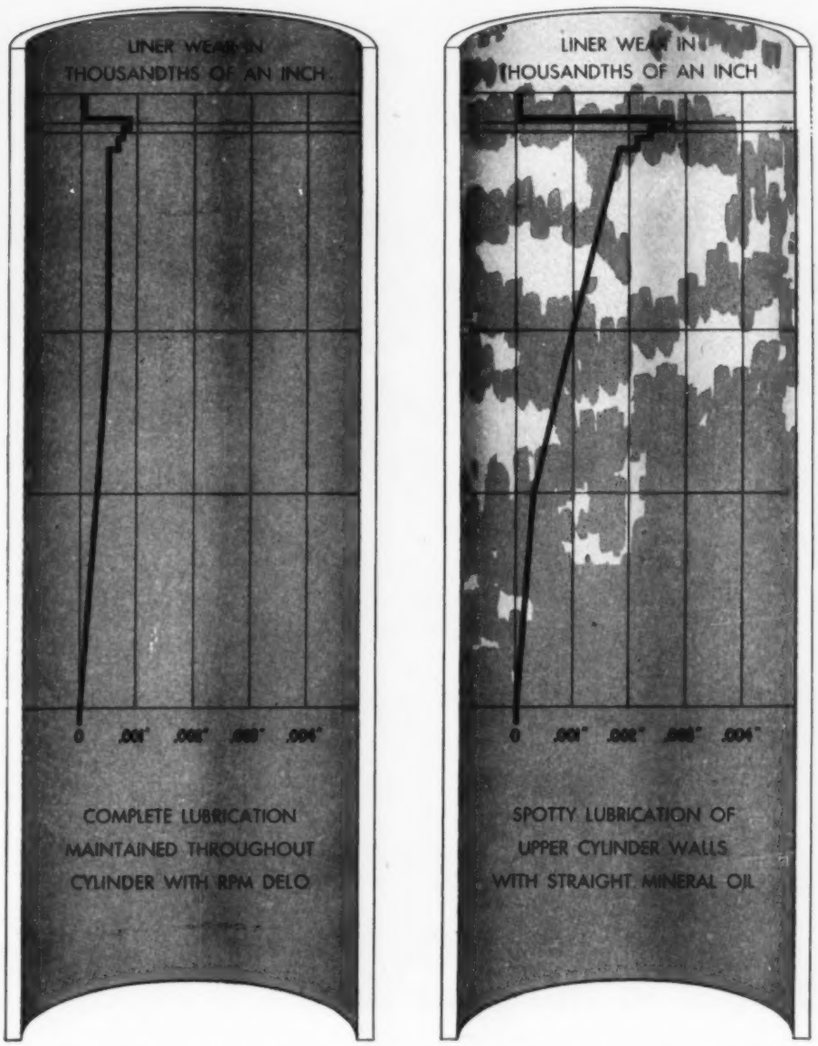
It is imperative then—to prevent relatively dry operation in the top piston ring high-temperature area—for the lubricant to have high-temperature adhesion characteristics.

To achieve this high adhesion factor under all operating conditions in RPM DELO Diesel Engine Lubricating Oil, a special compounding material was added. With this additive, RPM DELO will not run away from hot surfaces, thus preventing metal-to-metal contact on hot-running engine parts.

A typical example of the effectiveness of RPM DELO in preventing liner wear is offered by the Chicago, Rock Island and Pacific Railroad. One of its "Rocket" Diesel powered locomotives ran 157,076 miles on RPM DELO without an oil change, with liner wear of only .001 in.



Liner from Rock Island "Rocket" engine showing wear of only .001 in. after 157,076 miles on RPM DELO without an oil change.



These charts of one of the tests required by the Army in certifying oil for use in combat equipment, graphically illustrate (right) marked increase of liner wear in upper cylinder zone due to inability of straight mineral oil to provide full lubrication of this high-temperature area; and (left) reduction of liner wear by ability of RPM DELO to stick to these hot spots.

Other causes of liner wear minimized by RPM DELO include:

1. Corrosion caused by carbonic and other acids at low temperatures.
2. Scuffing of liners from rocking of piston rings in worn grooves.
3. Scoring and scratching of liners due to stuck piston rings.

Reducing liner wear to a remarkable degree is but one of RPM DELO's advantages in solving Diesel engine maintenance problems. Its other properties include: The ability of RPM DELO to eliminate ring sticking, to stop excessive deposits on rings and ports, and to prevent bearing corrosion.

RPM DELO has world-wide distribution and is marketed under the following names: RPM DELO, Caltex RPM DELO, Kyso RPM DELO, Signal RPM DELO, Sohio RPM DELO, and Imperial RPM DELO (concentrate). Ask your Diesel engine manufacturer or distributor for the RPM DELO supplier in your vicinity.

RPM DELO

Write on your letterhead for free booklet on RPM DELO, *Standard of California, Dept. T-12, San Francisco, California*

STANDARD OF CALIFORNIA

(Continued from page 144)

quired, but in the summer months it is necessary to supplement with the refrigeration plant.

Direction

The Fontana project is being built under the direction of A. L. Pauls, chief construction engineer. C. E. Blee was project manager until July, 1943, when F. C. Schlemmer took over this position. At that time, Mr. Blee assumed the duties of chief engineer, succeeding the late T. B. Parker. G. E. Murphey is construction superintendent, and Oren Reed is construction engineer.

The plant was designed under the supervision of the following members of the construction plant division: R. E. Martin, job engineer; A. F. Hedman, structural engineer; D. W. Yambert, mechanical engineer; and T. S. Whitehouse and J. C. Buchanan, electrical engineers, all acting under the direction of the writer as construction plant engineer.

FONTANA DAM
TENNESSEE VALLEY AUTHORITY
MAJOR CONSTRUCTION EQUIPMENT

2	42-in. gyratory crushers
5	3-cu. yd. electric shovels
10	diesel shovels (1½-yd. to 2-yd. capacity)
20	12-cu. yd. dump trucks
7	9-in.-dia. blast hole churn drills
2	standard 4¼-ft. cone crushers
2	short-head 4-ft. cone crushers
2	rod mills (9-ft. dia. by 12-ft. lor.g)
1	hydro-separator (5 ft. by 16-ft. dia.)
2	sand classifiers, rake-type (5x30 ft. and 7x30 ft.)
4	screens (5x12-ft. DD) over secondary crushers
8	sizing screens (two 6x14-ft. SD, two 5x10-ft. SD, four 5x14-ft. SD)
2	rinsing screens (5x14-ft. DD)
5	4-cu. yd. concrete mixers
1	automatic batching plant with 1,350-yd. bin
30	4-cu. yd. automatic air-operated buckets
12	flatcars, standard gage, for transfer trains
10	locomotives for transfer trains (three 25-ton, two 18-ton, three 15-ton, and two 10-ton)
2	300-ft. hammerhead cranes (22,000-lb. capacity at 150-ft. maximum trolley travel on each side)
4	40-ton revolving cranes
1	20-ton revolving crane
39	belt conveyors, more than 2 mi. total length
7	stationary air compressors (six 3,000 and one 1,500 cfm.)
6	Air-activated cement conveyors
4	6,000-bbl. cement silos
2	30-ton diesel locomotives for yard switching
4	stiff-leg derricks (20- to 40-ton capacity)
1	refrigeration plant for cooling water (255-ton capacity)
8	pumps (1,000 g.p.m. at 500-ft. head) for raw water system
1	substation (15,000-kva. capacity)
92	drills (44 wagon drills, 48 drifter drills)
6	diamond core drills
4	36-in. shot drills
1	locomotive crane (25-ton)
1	truck crane (8-ton)
1	pumpcrete machine (40 cu. yd. per hr.)
1	concrete gun (20 cu. yd. per hr.)
12	trucks, miscellaneous
	Complete equipment for machine shop and carpenter shop

. . . built to the precision standards of an engine-builder . . . with extra quality where it counts

The same exacting care and precision fit is built into the compressor unit as into the engine itself. You get accurately balanced crankshafts with integral counterweights . . . the weight of pistons and rods is held to extremely close limits.

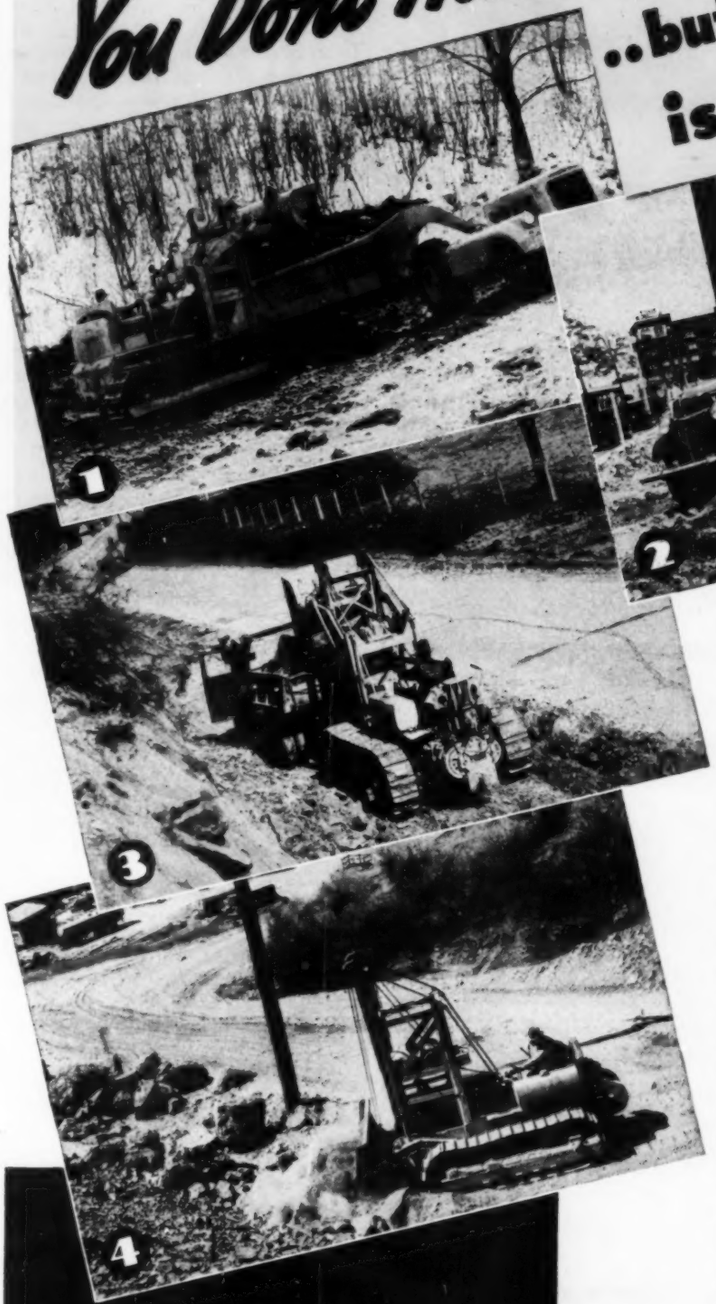
The heavy-duty engine provides such quick-maintenance aids as overhead valve construction . . . hardened valve seat inserts . . . and removable wet sleeve cylinders. Famous Le Roi Compressor design includes circumferential cooling fins for maximum cooling effect . . . forced-feed lubrication . . . features for extra mobility. Le Roi Compressors are the *only* ones in which *both* engine and compressor are made by the same manufacturer to give you "matched" performance and undivided responsibility. Complete range of sizes from 60 to 500 C.F.M. Write for bulletins. See your nearby Le Roi distributor for aid in filling out government forms for new units or vital repair parts.

C-56

Le Roi Company
1712 South 68th Street • Milwaukee 14, Wisconsin
Distributors and Service Stations in all Principal Cities

LE ROI

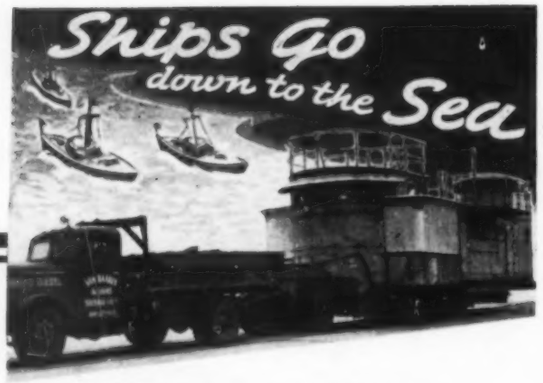
You Don't Have to Baby 'Em ..but PROPER CARE is GOOD BUSINESS!



1. LOADING — Big 2½-yard T7 TRAXCAVATOR loading DW10 wagon.
2. EXCAVATING for a large building foundation with Model T7 TRAXCAVATOR.
3. ROAD WIDENING with a TRAXCAVATOR goes forward with little interruption of traffic.
4. BULLDOZERS available for all TRAXCAVATORS. Interchange quickly with the bucket.

TRAXCAVATORS are built for hard, continuous work and will give long service with ordinary care. Records of machines on toughest jobs prove this fact, but service records likewise prove that proper lubrication and maintenance pay big dividends in longer life and lower net cost of operation. Especially in these times, when new machines are scarce and replacement parts are not always too easily obtained, it is wise to give special thought and action to maintenance. Have your Trackson-"Caterpillar" dealer inspect your TRAXCAVATORS and other TRACKSON Tractor Equipment to see that they are ready for the busier days ahead. Should you need another parts or instruction manual, ask your dealer, or write direct to TRACKSON COMPANY, Milwaukee 1, Wisconsin.

TRACKSON
TRACTOR EQUIPMENT



ON ROGERS TRAILERS

AMERICA'S shipbuiding industry launched more ships in 1944 than all the rest of the world combined.

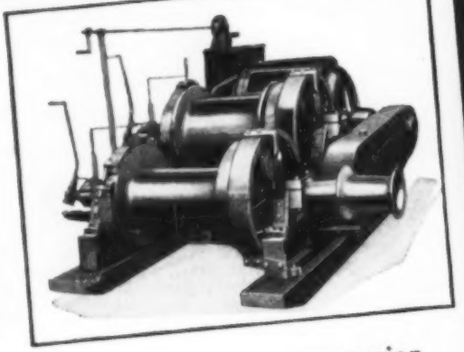
ROGERS TRAILERS are a vital link in the mass-production method of ship construction for they are transporting heavy machinery . . . boilers, bulkheads, engines . . . speeding Victory ships down to the sea!

ROGERS TRAILERS are serving efficiently on the homefront too and new models which will be available when war contracts are completed, will be even more efficient than the multitude which have been so successfully operated by industry for many years.

EXPERIENCE *builds 'em*
PERFORMANCE *sells 'em*

ROGERS BROS. CORP.
ALBION, PENNA.

Hoists to Fit the Job



Lidgerwood hoists have earned a 70-year reputation for dependability and efficiency *on the job*. There's a Lidgerwood gasoline, steam, electric or Diesel hoist to fit every construction need. When you need a hoist inquire *first* of LIDGERWOOD.

HOISTS FOR:
CABLEWAYS
INDUSTRIAL PLANTS
CONTRACTORS
MINES—DOCKS
RAILWAYS

LIDGERWOOD
ESTABLISHED 1873
Manufacturing Company
MAIN OFFICE AND WORKS • ELIZABETH, NEW JERSEY

Pneumatic Tools

(Continued from page 61)

saw, two to sort the timber and chalk one edge, one man to feed the saw and one to tail the saw. The saw blades had to be changed frequently to permit sharpening. The method of filing these saws to get the best results was to file the teeth straight across and keep plenty of set in them, the extra set keeping the saws from overheating. To keep the throttle open a wood wedge was used in the handle of the saw.

To rip the keys for the forms, a similar setup was used. This time the saw was tilted to the right at a 45-deg. angle in the table, and a gage or guide placed to the left of the saw. The operation of this rig was similar to the ripping table, with material and time for construction approximately the same as the rip table. Fig. 2 shows the setup of blade and chamfered key being pushed through.

To square the ends of the timber after it had been ripped, a long table was constructed on five saw horses, the table being 20 ft. long and 18 in. wide, the saw horses approximately 27 in. high. On the edges of the table 2x4's were nailed forming a trough 2½ in. deep. Near the center of the table a form or guide was made to hold the saw. The frame held the saw at right angles to the table to insure a square cut. To make the frame 2x6s were used, with a 1x2-in. strip for the left guide and a ¼x1-in. metal bar for the other. These two guides formed a slot for the saw to slide in and to hold the saw square with the table at all times. Fig. 3 shows end squaring.

Simple Operation

The operation was simple. As the timber came from the ripsaw or other sources it was shoved down the trough to where the saw could cut it square. The saw was pushed forward to cut the end of the timber, then pulled back to permit the timber to be pushed on through for cutting the other end. Three men were required to operate the cut-off table, one to feed the timber to the saw, one to operate the saw and one to tail the saw. This rig was set up in tandem with the ripsaw. When short blocks were to be cut, a stop block was placed in the trough at the desired distance from the saw, so all blocks could be cut without individual measurements.

To cut timber at an angle a similar

(Continued on page 150)

STILL BUSY...

Shortening the Road Home!

All the way from wind-swept northern wastes to the sunnier clime pictured here, Huber Road Rollers are busy on the construction projects which accompany each thrust of our armed forces toward their next objective. But it won't be long, we trust, until these new Hubers . . . which are well worth waiting for . . . will be ready to help you speed this country's post-war highway improvement program.

THE HUBER MFG. COMPANY • MARION, OHIO, U. S. A.

HUBER ROLLERS

WARRINGTON-VULCAN
Single-Acting Steam
PILE HAMMERS

THE FIRST TYPE OF PILE HAMMER WE BUILT··

STILL WIDELY USED

Old in years (62)—modern in performance—the WARRINGTON-VULCAN Single-Acting Steam Pile Hammer demonstrates soundness and adequacy of design. It has rapid, regular, and continuous action — it drives any kind of pile — wood, concrete, or steel. Operates at a medium steam pressure and delivers a moderate frequency of low velocity blows from a relatively heavy ram.

Descriptions of VULCAN types developed during years that followed the introduction of the WARRINGTON-VULCAN are given below. Further details gladly sent on request.

- SUPER-VULCAN Differential-Acting Closed Type Steam Pile Hammers, 1800—3000—5000—8000—to permit under-water work.
- SUPER-VULCAN Differential-Acting Open Type Pile Hammers, 18c—30c—50c—80c—use 25 to 35 per cent less steam per blow—give twice the number of blows per minute.
- VULCAN Pile Extractors for pulling sheet steel, wool, concrete, H-beam, and pipe piles. Sizes 200, 400, 800.

VULCAN IRON WORKS
Since 1852
331 North Bell Avenue
Chicago 12 ---Illinois

(Continued from page 148)

frame and guide was placed near the first frame on the table at 45 deg. The saw that was used in the cut-off frame was used in the 45-deg. frame. The three saws were furnished by the letter companies and the 315 cu. ft. per min. air compressor by H&S Co. The material used consisted of sufficient 2x6s to construct the table and frame, 2x4s for saw benches and to form the trough, enough ¼x1-in. metal for guides and one Skilsaw. Approximate construction time was one day, using one carpenter.

To hold the forms in place after they had been set on the runway subgrade, preparatory to receiving concrete, was another problem, largely because the forms had to be set on an existing gravel and asphalt base. This was accomplished by means of kicker blocks, illustrated in Fig. 4. The blocks were made of a piece of 2x6, 16 in. long with two ⅝-in. holes. The holes were for drift pins which were to hold the blocks in place. On top and in the center flush at one end of the 2x6-in. block a piece of 2x4, 6 in. long, cut on a 45-deg. angle at one end, was nailed for the form to rest against. Cutting these short 2x6-in. blocks and the 45-deg. blocks was accomplished on the long table with the use of the two guides. Two saws could be used on the table at the same time.

Boring 6,000 Holes

More than 6,000 holes had to be bored. This called for a lot of manpower and time. Something had to be done so the production could be speeded up and a method was devised for boring the holes quickly and with minimum labor. The plan was to use pipe, wire, bolts and bucket assembled into a jig for boring holes. The bucket, filled with sand, was used as a counterbalance for the wood-boring machine, to make it operate more easily. The pipe was used as slides to make the drill slide straight up and down. Two holes were drilled in each block, one 3 in. from the end and 1½ in. from the side, the other hole 9 in. from the end and 1½ in. from the other side. A sliding frame was made to hold the block in place while boring. When one hole was bored, the frame was shoved forward against a stop block, the block then being in position for the next hole to be bored. (See Fig. 5.) The operation was very simple: The throttle was opened and the drill handle pulled down; after the hole was bored the throttle was closed and the handle released. The drill was raised by the counterweight. The jig worked satisfactorily and approximately 2,600 holes were drilled in 8 hr. by two men. One man operated the drill, another man placed

(Continued on page 152)

Try them on your toughest problems!

For years the Hool and Kinne Library has been providing structural engineers with the facts they need *on every problem concerned with the design and construction of civil engineering structures.* This is a library that must be USED to be fully appreciated—that is why we want YOU to use it. We want you to forget the financial side of this proposition until you have solved some knotty problem that you may be up against—to find out how a specialist in that particular field would handle it. We want to prove to you that this library furnishes you with what amounts to the consulting services of 54 recognized structural engineering specialists.

HOOL AND KINNE'S

STRUCTURAL ENGINEERS' Handbook Library

With many newly revised sections containing up-to-the-minute STANDARDS and PRACTICE

THESE six books offer you the most complete compilation of structural engineering data ever published; they furnish you with genuinely professional information drawn from records of actual practice and written by a large staff of specialists.

They cover the how and why of foundation and substructure design and construction, the general theory of structural members, the detailed design of such members and the design of their connection with other members—they explain the principles of statics, reactions, moments and shears in beams and trusses, influence lines, methods of computing stresses in lateral trusses and portal bracing—they give details of design and construction of steel, timber, and concrete structures of all types.

Examine the Library for 10 days in your home or office

6 volumes, 3575 pages, fully illustrated.

McGraw-Hill Book Co., 330 W. 42 St., N. Y. 18
You may send me Hool and Kinne's Structural Engineers' Library for my inspection. If the books prove satisfactory, I will send $3.50 in 10 days and $3.00 per month until I have paid the price of the books, $27.50. If the books are not what I want, I agree to return them postpaid within 10 days of receipt.

Signature .....
Home Address .....
City and State .....
Name of Company .....
Occupation .....
(To insure prompt shipment write plainly and fill in all lines.) C.M. 12-44

THE Thermoid Line has a reputation for reliability earned by many years of trouble-free service. Contractors in many fields choose Thermoid, not only for ordinary jobs, but for those really tough construction projects that depend so much on rugged, reliable equipment.

There's a good reason for this preference for Thermoid. Thermoid Hose (air, water, steam, suction), Thermoid Conveyor Belting, Industrial Brake Lining and other Thermoid Products are designed and built by engineers who see that every Thermoid Product meets your *on the job* requirements. Consequently, Thermoid Products have built-in reliability and dependable performance. It's Good Business to do Business with Thermoid.

Don't put it off 'til tomorrow . . . Buy More War Bonds Today!

THE THERMOID LINE INCLUDES: TRANSMISSION BELTING • F. H. P. AND MULTIPLE V-BELTS AND DRIVES • CONVEYOR BELTING • ELEVATOR BELTING • WRAPPED AND MOLDED HOSE • SHEET PACKINGS • INDUSTRIAL BRAKE LININGS AND FRICTION PRODUCTS • MOLDED HARD RUBBER AND PLASTIC PRODUCTS.

Thermoid Rubber

DIVISION OF THERMOID CO.
TRENTON, NEW JERSEY

"CLEVELANDS"
Fast – Flexible – Rugged
MEET FULLY YOUR DITCHING REQUIREMENTS for - - - -

- - - Gas, Oil, Water Lines — Air Fields — Sewers — Drain Tile— Telephone and Telegraph Conduits and Building Foundations —

Finely balanced—correctly designed—powerful—rugged—fast—easily maneuverable on full crawler mounting—and strongly resistant to wear and abuse, "CLEVELANDS" represent the utmost in ditching economy and efficiency. That's why they are delivering Top Performance on many military projects and civilian jobs.

"CLEVELAND" Equipment includes: — Ditchers (Wheel and Ladder Type in several models) Side Boom Backfillers — Tampers — Pipe Cranes — etc.

THE CLEVELAND TRENCHER COMPANY
20100 ST. CLAIR AVE "Pioneer of the Small Trencher" CLEVELAND 17, OHIO
"CLEVELANDS" Save More...Because they Do More

WELLMAN WILLIAMS TYPE BUCKETS

SINCE 1931 Wellman Buckets have combined the many special mechanical features of the famous Williams Clamshell Bucket with the construction "know-how" of The Wellman Engineering Company. For 50 years Wellman has built heavy bulk material handling equipment for steel plants and other heavy industries.

Multiple Rope and Power Arm Types • Dragline • Power Wheel • Dredging • Special Service Buckets ⅜ to 16½ Yd. Capacities.

Welded Rolled Steel Construction
FOR GREATER STRENGTH
LIGHTER WEIGHT
LONGER LIFE

Welded construction, once confined to custom-built Wellman Buckets for steel mill and dredging service, is now featured in every Wellman-Williams Bucket.

SEND FOR FREE BULLETIN

Tell us about your particular requirement and we will send full description of construction and features in special bulletins which clearly prove why YOUR NEXT BUCKET SHOULD BE A WELLMAN.

THE WELLMAN ENGINEERING COMPANY
7017 Central Avenue • Cleveland 4, Ohio
Sales and Service Agencies in principal cities

(Continued from page 150)

and removed the block. Construction time for drill jig was approximately one day for two men.

Paint Spray Used for Oiling

After the forms and kicker blocks were made, they had to be coated with oil. There were not enough paint brushes available for this job and the manpower required was too great. The camouflage paint spray was resorted to and after experimenting with different type nozzles, one was found that would work satisfactorily. This machine did the work of 16 men and did a good job. Oil that had been drained from crank cases was obtained from the motor pool. The crew consisted of one man.

This setup for form-building proved very satisfactory. The total amount of form, including keys and kicker blocks, was made in approximately 15 days, working 8 hr. a day. The crew consisted of one officer, one NCO in charge and 15 men. During the building of the forms, keys and kicker blocks, the saws and drills required no repairs. The saws had to be greased daily and sharpened every 4 hr. of use. After the forms were made, the jigs were used for many other jobs, such as making stakes for surveyors, expansion joints and ripping and cutting lumber for various other jobs. The tables were built so that they could be moved to other jobs for use. The job was completed (Fig. 6) on schedule and many a long hard hour of labor saved, thanks to the ingenuity of the officers and enlisted men in the Battalion.

★ ★ ★

Air-Entraining Cement

(Continued from page 66)

shown in Fig. 3. Between the dowels, and spaced 6 ft. on centers both horizontally and vertically, were 2-in. grout holes—drilled into the old concrete to a depth of from 3 to 4 ft. with 2-in. steel pipe extending from the old concrete to the form.

After the new facing concrete was poured and the forms were stripped, each pipe was grouted under about 12 ft. of head, starting with the bottom row, the purpose being to fill the cracks

(Continued on page 154)

Isaacson

HYDRAULIC TRAC-DOZER

The Perfected Earthmover

Isaacson engineers have been improving hydraulic operation for years. Faster blade operation from a pump that is more efficient is but a sample. You gain both speed and power on blade operation. You will finish your jobs quicker.

Your tractor will last longer because Isaacson Trac-Dozer is "balanced." The blade hugs the tractor yet can be fully adjusted for tilt or angle.

The radiator tank and Isaacson Valve have eliminated most of the piping. Yes, it's streamlined and modern in every respect You will be amazed at its operation. **Let your next hydraulic be an Isaacson Trac-Dozer.** There is none better.

Write today for our new booklet soon to be off the press and which will explain to you in detail this simplified hydraulic design.

17 AWARDS IN WAR PRODUCTION

WHEELTOR

KLEARING BLADE

SUPER-ROOTER

KABLE TRAC-DOZER

TAMPING-ROLLER

KARRY-BUGGY

HYD. TRAC-DOZER

WINCHOIST

TRAC-KRANE

KARRY-WAGON

LOGGING ARCH

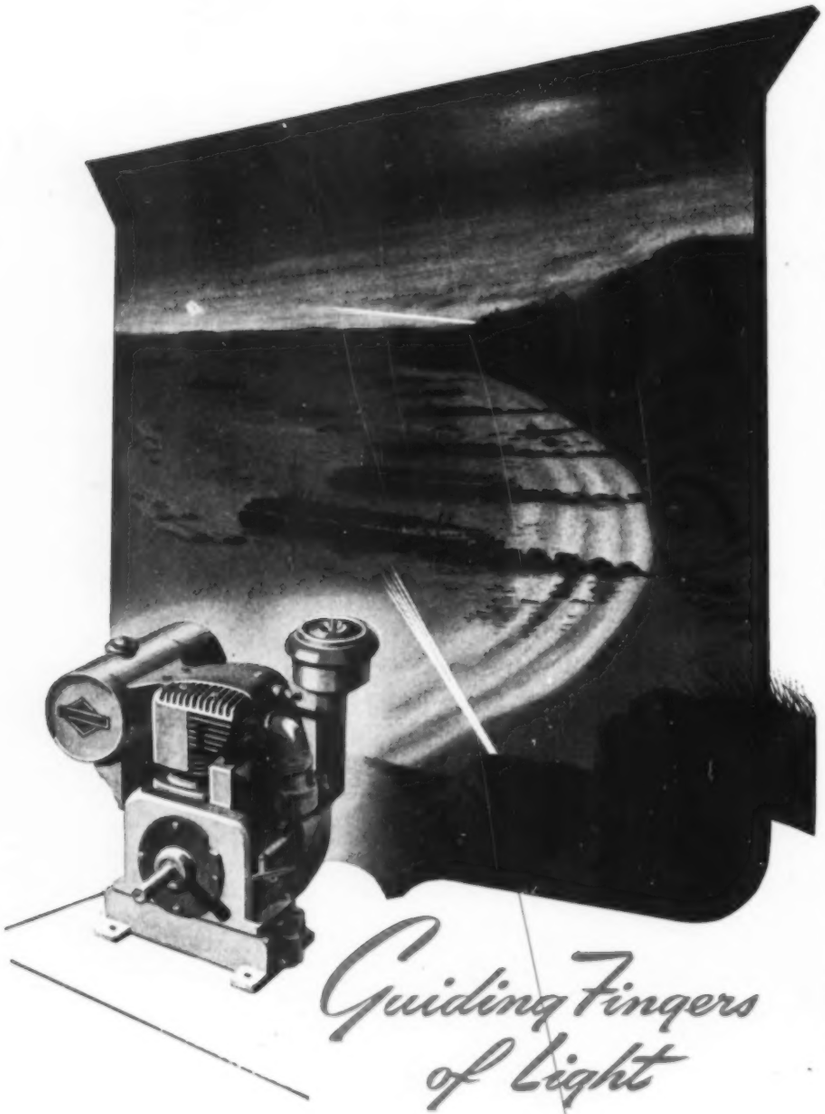
DUMP-SKRAPER

"Engineered Tractor Equipment"

ISAACSON

Iron Works

SEATTLE



Guiding Fingers of Light

From newly established positions, portable beacon units guide and warn supporting ships and aircraft. Their electric generating plants are powered by rugged, quick-starting Briggs & Stratton engines — another one of many vital war services by hundreds of thousands of Briggs & Stratton engines.

Air-Cooled Power

4 CYCLE BRIGGS & STRATTON GASOLINE ENGINES

BRIGGS & STRATTON leadership in design, engineering and precision manufacture is backed by the performance record of more than TWO MILLION Briggs & Stratton engines—and a quarter-century of *continuous* production of *"air-cooled power."* You can profit by this experience in your plans for the future—whether you manufacture, sell or use gasoline-powered equipment or appliances.
BRIGGS & STRATTON CORP., Milwaukee 1, Wisconsin, U. S. A.

(Continued from page 152)

in the old concrete between the scrolls and the restored face. Deducting the contents of the grout pipe and the grout holes in the concrete, there was a net average of 2.7 gal. of grout per hole used in this process.

Fig. 4 shows a section of the building face at the upstream end of the station opposite unit 6 where the spalling was not as severe. The lower 7 ft. of this face opposite units 5 and 6 and under the pump pit opposite units 3 and 4 was restored with concrete placed behind a form. Above this elevation the face was restored with Gunite in which steel wire mesh was embedded. Fig. 5 shows the station face at units 5 and 6 after Guniting.

Granite Protecting Wall

The lower 4 ft. of the protecting wall is granite, and this band of granite is carried around the pump pit bay, replacing the lower 1 ft. of the original curtain wall a portion of which was disintegrated. The top of this granite band is approximately 2 ft. above the tail-water with station capacity operating condition and except at the pump pit bay is supported on 18-in. square granite pedestals.

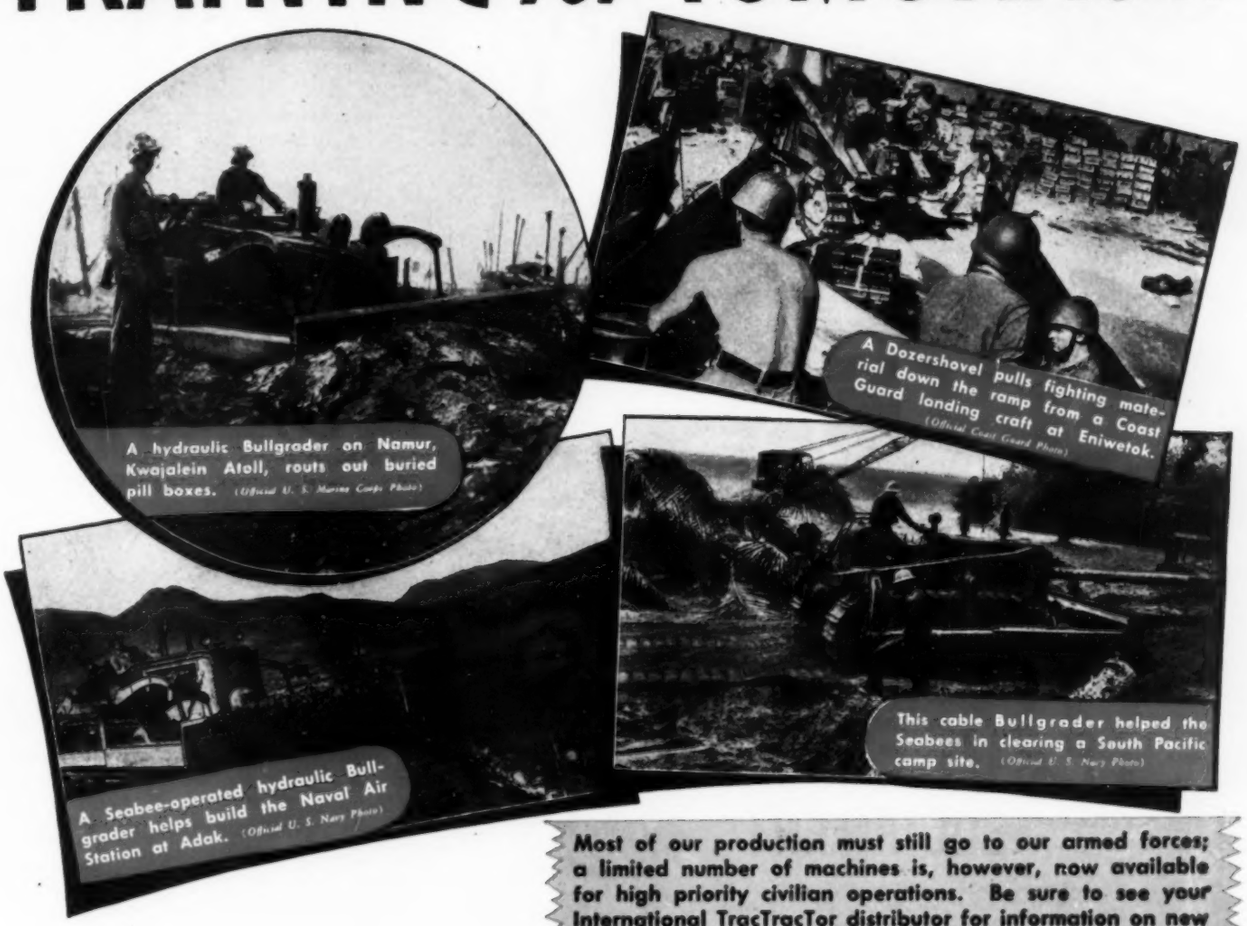
The openings under the granite are 18 in. high and about 18 ft. long. These are to permit the wheel discharge which in winter has a temperature of about 32 deg. F., to surge in and out of the space between the protecting wall and station wall as insurance against freezing of the water in this space and as an aid in maintaining the air temperature in this space above 32 deg. F. On the inside face of these openings are hinged from the granite heavy wooden shutters which swing inward and float in a nearly vertical position when the station is operating but swing down to close the openings when the station is idle. At the steel columns of the pump pit bay the surrounding concrete was all replaced and encased in granite blocks carried below the extreme low water elevation, as shown in Fig. 6.

All granite was furnished to dimensions requiring no cutting on the job. To aid the long 5-ton blocks which span the 18-ft. openings to support the load of the wet concrete 25 ft. in height above the granite and poured in one operation, two temporary wooden boxes were located in each span as shown in Fig. 7. The bottom third of each box was filled with concrete, the middle third with consolidated sand and the top third with concrete. After setting the blocks the joints above the granite pedestals and above the boxes were grouted.

Fig. 3 shows 6x6-in. timber stringers

(Continued on page 156)

Fighting Today . . .
TRAINING *for* TOMORROW



A hydraulic Bullgrader on Namur, Kwajalein Atoll, routs out buried pill boxes. (Official U. S. Marine Corps Photo)

A Dozershovel pulls fighting material down the ramp from a Coast Guard landing craft at Eniwetok. (Official Coast Guard Photo)

A Seabee-operated hydraulic Bullgrader helps build the Naval Air Station at Adak. (Official U. S. Navy Photo)

This cable Bullgrader helped the Seabees in clearing a South Pacific camp site. (Official U. S. Navy Photo)

Most of our production must still go to our armed forces; a limited number of machines is, however, now available for high priority civilian operations. Be sure to see your International TracTracTor distributor for information on new machines, rentals, and service.

To the men in the construction phases of Allied warfare, the fighting fronts are training courses, too — perilous, exacting, efficient. The earth-moving problems encountered are staggering, but the speed with which victories have been won attests to the skill these men have acquired. With Bullgraders, Bulldozers, Dozershovels, Scrapers, etc. as their weapons, they are writing a new page in military history.

Prominent and significant on the fighting fronts, Bucyrus-Erie tractor equipment operated by war-trained men will be leaders in tomorrow's reconstruction too. N-74C

BUCYRUS ERIE TRACTOR EQUIPMENT

SEE YOUR
INTERNATIONAL TRACTRACTOR
DISTRIBUTOR

Water Seasoned
AS THE "MARS"
● Designed for special service and tested under most gruelling conditions Owen Dredging Buckets have proved to be uncommonly efficient and durable for difficult underwater operations.
THE OWEN BUCKET CO.
6020 Breakwater Ave., Cleveland, O.
BRANCHES: NEW YORK • CHICAGO
PHILADELPHIA • BERKELEY, CAL.
OWEN BUCKETS
A MOUTHFUL AT EVERY BITE

Materials
PROCESSING
EQUIPMENT
Sifters, Crushers, Cutters, Dry and Liquid Mixers, Mills, Grinders, Pulverizers, Conveyor Systems, Complete Installations.
The handling equipment construction "know-how" of the Mercer Engineering Works, Inc., Clifton, N. J. . . . The more than 40 years processing equipment experience of Robinson Mfg. Co., Muncy, Pa. . . . All are embodied in and represented by
MERCER-ROBINSON, CO., INC.
30 CHURCH ST., NEW YORK 7, N. Y.
Materials
HANDLING
EQUIPMENT
Trailer Trucks (All Types) Wheel Tractor Cranes (3 to 7 ton) Fork Lift Trucks, Lift Platforms, Hoists, Live Skids, Wheels, Casters.

(Continued from page 154)

being laid inside of the protecting wall location to which industrial rail was spiked, having a gage of 24 in. The car, about 14 ft. long, operating on this track, transferred the granite blocks to their proper longitudinal locations where they were swung from the car to the wall by chain falls hung from I-beams projecting through the ventilator opening shown in Fig. 3.

Fig. 8 shows one of the 5-ton blocks being transferred from the truck to the industrial car, by a Northwest crane. When the blocks were properly located the joints were calked with old rope and grouted. After removing the rope, lead was poured into the joints to a depth of about ¾ in.

Air-Entrained Concrete

All of the 300 cu. yd. of air-entrained concrete was transported in 5-yd. mixer trucks at a distance of about 45 mi. The greatest amount placed in one day was 76 yd. when seven trucks were in operation carrying 4 yd. per trip. No water was added to the mix until it arrived at the job, thus permitting control of the water content.

The mixture was designed to obtain proper proportions of cement, sand, gravel and water for air-entrained concrete by use of Duraplastic cement. Since air-entrained concrete has evidently been so successful in reducing the spalling of pavements it would seem that its use on this work would be very beneficial.

Compared with normal portland cement, air-entraining portland cement increases plasticity, requires less water for a given slump or consistency, and less sand and water for a given yield. Accordingly, on this job where Atlas Duraplastic air-entraining cement was used, the estimated reduction of sand was 150 lb. per cu. yd. and of water ¾ to 1 gal. per sack of cement compared with a mix using normal portland cement.

The concrete was mixed in a transit mixer in the proportions of 6.375 bags or 599 lb. of cement; 1,216 lb. of sand containing about 4 percent moisture; and 1,909 lb. of 1-in. maximum size gravel containing about 1 percent moisture. Enough water was added to produce a 6- to 7-in. slump. The concrete for the walls was placed using chutes extending from the top of the walls. There was practically no segregation of the mix in the chutes and the concrete moved down the chutes without difficulty. There was no appreciable water gain on top of the concrete walls after all the concrete had been placed without stopping. After the forms were removed, the con-

(Continued on page 158)

QUICK QUIZ FOR CONSTRUCTION MEN

3 Answers that May Save You Time, Money and Machines!

Q **Can You Get "M. P. T."* From Your Machines?**

A Definitely . . . by reducing "time-out" for lubrication! In one case, Alemite Lubrication Specialists cut by 50% a contractor's lubricating time on a group of 5 machines . . . actually gaining an hour and 40 minutes "M. P. T."* every day! What's more—the Alemite System paid for itself in weeks!

*More Productive Time

Q **Is Hand-Type Greasing Costing You Too Much?**

A It's bound to! But you can save money and do a better job using Alemite's "on the job" barrel-to-bearing method. On one construction project Alemite Portable Service Stations reduced wear of track rollers on "cats" by 32% . . . reduced oil and grease consumption by 19%!

Q **Does Winter Weather "Freeze" Your Grease and Oils?**

A Not if they're Alemite's! Because Alemite builds an extra-wide operating range into *all* of its grease and oils. The result is amazing toughness and free-running qualities that fight friction in the coldest weather! Alemite "Sub-Zero" lubricant, for example, is designed for heavy-duty cold weather work—*actually protects bearings down to 40° below!* You can have that kind of performance, too!

This Winter Get "On the Job" Power Lubrication with an Alemite Portable Service Station!

• Winter's no worry when you've got this complete lubrication department on wheels working for you! It carries lubricants to the machines on the job . . . delivers lubricants easier and faster and with less spoilage due to "barrel-to-bearing" control. Developed by Alemite, the unit includes high- and low-pressure Alemite Barrel Pumps, Alemite Motor Oil Dispenser, hose reels and gas engine equipped compressor.

It's proving its ability to fight ruinous winter friction and costly shutdowns on thousands of construction jobs. Write for catalog to: Alemite, 1840 Diversey Parkway, Chicago 14, Illinois. In Canada: Belleville, Ontario.

Another Product of STEWART WARNER

WANTED

Tough Job by Man with "MML" Degree!

This man, an Alemite Lubrication Specialist, is a "Master of Modern Lubrication." His technical training, skill and experience equip him to come on your job and consult with you about applying the most modern lubricating methods. He has added more productive time to machines, saved lubricants and man power. He has installed safer, surer, more accurate lubricating methods.

He's ready to go to work for you now, backed by the world's most experienced organization in the handling and application of lubricants. Call him. Or, if you prefer, write Alemite for the address of the nearest Alemite Lubrication Specialist.

ALEMITE REG. U. S. PAT. OFF. *First in Modern Lubrication*

CONSULTATION • ENGINEERING • EQUIPMENT • LUBRICANTS • MAINTENANCE

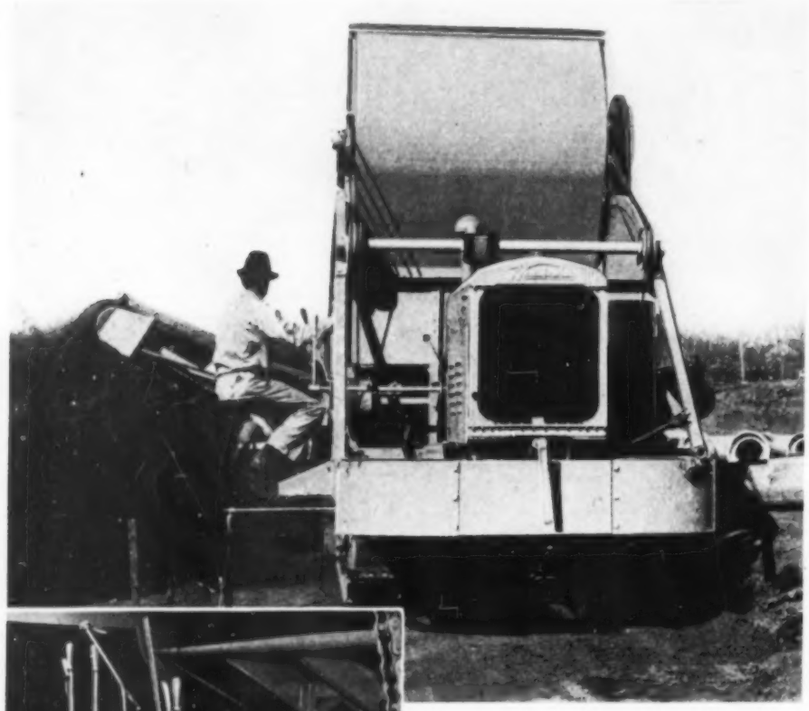
(Continued from page 156)

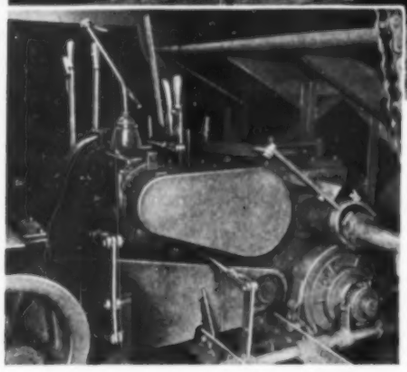
crete surface was free of "honeycomb" spots and sand streaks.

It so happens that about 15,000 gal. per hour of station transformer cooling water is discharged into the river at the downstream end of the station which in winter has a temperature of 70 deg. F. This water is now conducted to a trough located about 12 ft. above normal water level and extending the entire length of the building. The trough is formed by attaching to the new concrete face of the building 2x12-in. wood planks having a 30-deg. angle with the face. The joint between planks and wall is adjustable to permit a sheet of warm water to flow continually down the wall and maintain the temperature of the inclosed space well above freezing.

Figs. 9 and 10 show how the concrete was transferred from the mixer trucks to a 4-yd. elevated hopper by means of a 1½-yd. bucket suspended from the station crane. From the hopper the concrete was conducted through a window to the concrete chutes shown in Fig. 11. The absence of segregation of the concrete in the chutes as shown in Fig. 11 is one of the notable features of air-entrained concrete, and assures a uniform mixture in the form where vibration is used sparingly. Fig. 12 shows an overall view of the work when about completed.

PARSONS
TRENCHLINER





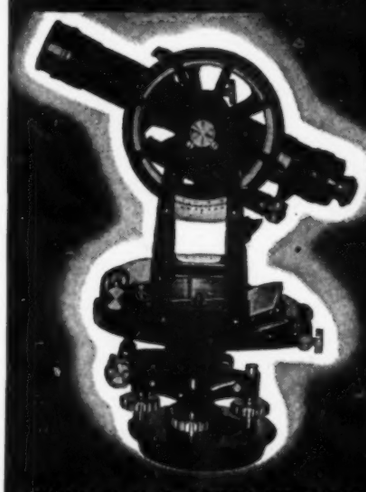
Enclosed Gears Running in Oil

Gear cases, power unit, clutches, operating levers, are easily accessible from either side of the machine. Adjustments are quickly made. All operating levers are grouped immediately ahead and within easy reach of the operator. Seated to the side of the machine, the operator has full vision to front and rear as well as of all operating functions.

Two sets of speeds . . . five in each transmission . . . permit maximum operating speeds to suit the greatly varying digging conditions of trenching operation. Gears are enclosed, running in oil . . . cut from solid steel blanks, fitted on precision ground alloy steel shafts. Anti-friction bearings are used for mounting all the gear case shafts. Gear cases are dust tight.

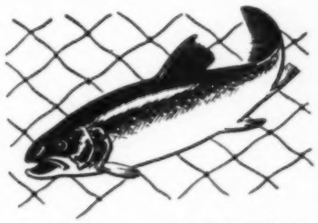
THE PARSONS COMPANY
. . . . NEWTON, IOWA . . . .
TRENCHING EQUIPMENT
PARSONS

Serving the Services is a HIGH HONOR
WHITE TRANSITS and LEVELS
are doing an outstanding job throughout the World



TYPE II U. S. ARMY TRANSIT
• ACCURACY • PRECISION
• DEPENDABILITY
Recommended for precise Municipal, Railroad, Highway and Bridge Work.
DAVID WHITE CO.
315 W. Court St. Milwaukee 12, Wis.
• Send for Bulletin 1039

In the "mining" of petroleum, as in the mining of many other ores and the production of aggregates, Cummins Dependable Diesels play a vital role. They power drilling rigs, trucks, shovels, dredges and many other types of equipment . . . have established an enviable record for reliable, low-cost performance on the toughest 24-hour-a-day jobs.



America's commercial fishing boats are bringing in record catches to meet record war-time requirements for fish and fish by-products. Many of these boats are Cummins Diesel-powered because fishermen everywhere know that the best assurance of being "first out and first back" is a Cummins Marine Diesel.

Basic in war and basic in peace is the vast logging industry of the Northwest. Here, the performance of Cummins Dependable Diesels in yarders, loaders, trucks and tugs explains why Cummins Diesel power is known among loggers as "the power behind CHEAP LOGS."

In agriculture and its many allied industries, Cummins Diesel power has innumerable applications. It is widely used in the West for irrigation purposes . . . in cotton gins, flour and feed mills, ice plants, dairies and many other places where its economy and dependability have been instrumental in increasing production and also decreasing costs.

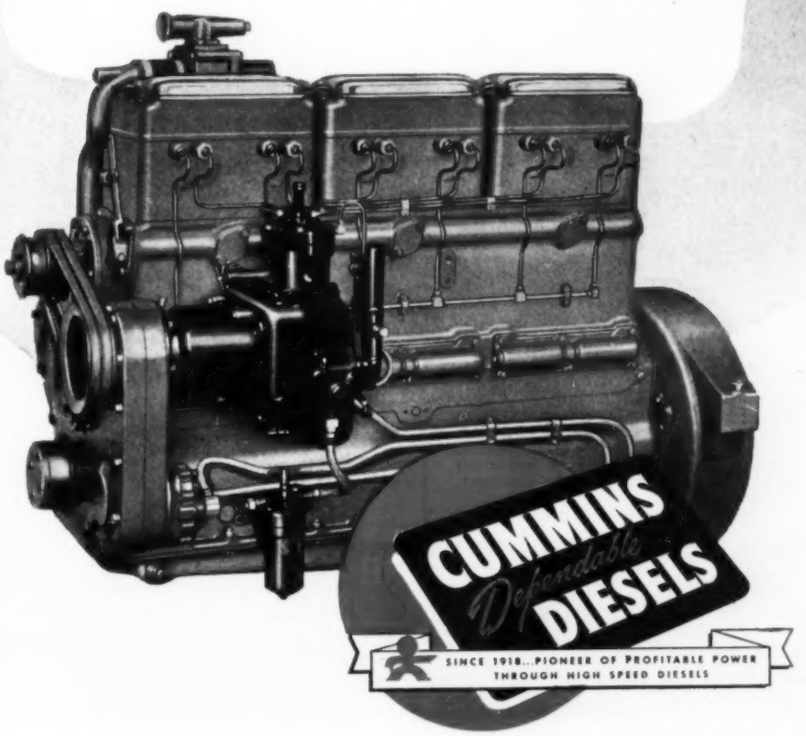
Automotive models • marine engines for propulsion and auxiliary power • power units of all types • stationary engines • generating sets • locomotive models.

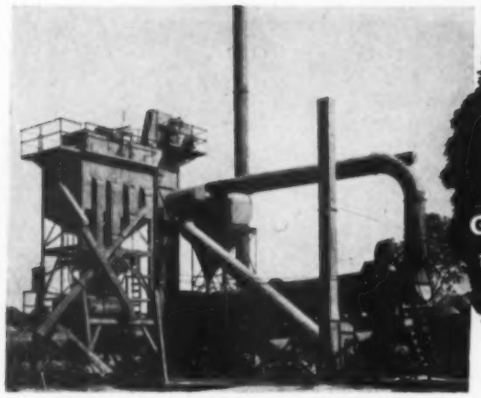
Backbone of every Basic Industry

In the "mother" or basic industries which produce the raw materials—agriculture, mining, commercial fishing and logging—and in the countless allied industries that play a part in the conversion of raw material into finished product, the development of the high speed diesel in 1932 went a long way toward changing modern concepts of power.

This diesel was a Cummins Diesel. Once and for all it struck away the shackles of excessive weight and size which had so long limited the use of diesel power. Once and for all it proved that diesel power could be applied to virtually any heavy-duty job and do that job—cheaper, faster, longer.

Since 1932, continued refinements in every phase of design, construction and material specification have produced still further improvements in the Cummins Diesel's operating economy . . . still further reductions in its weight and dimensions per horsepower. That's why operators and builders of all types of powered equipment—automotive, industrial and marine—have turned to Cummins for the dependable, low-cost power which is the backbone of industry. CUMMINS ENGINE COMPANY, INC., Columbus, Ind.





Refined TO PROVIDE Greater Compactness, Increased Capacity and Efficiency

H & B Portable (PA-30) Asphalt Plant

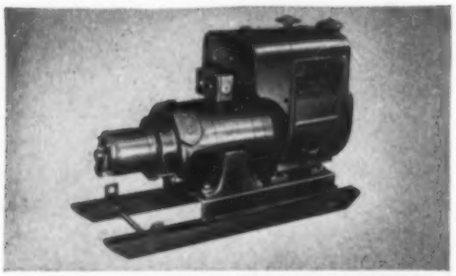
This popular portable asphalt plant has been made even more compact and efficient by several refinements in design. A larger fan and a new horizontal cyclone dust collector are used, and the duct system from the dryer to the dust collector and from the dust collector to the exhaustor has been redesigned. The exhaust fan, motor which drives the dryer, and the speed reducer are combined in one completely assembled unit which is mounted on a separate platform. This decreases the length of the dryer unit, and greatly facilitates handling. A new type of screen reduces the overall height of the plant—without reducing the bin capacity.

Complete information on this more efficient portable plant will be furnished on request.

HETHERINGTON & BERNER Inc.

735 Kentucky Avenue • Indianapolis 7, Indiana

Hetherington & Berner



MASTER GAS-ELECTRIC GENERATING PLANTS

COMPACT PORTABLE

SAVE TIME AND SPEED WORK WHEREVER POWER OR LIGHTING IS REQUIRED

Eleven basic sizes from 500 watts to 17,000 watts and 30 different types to meet all AC or DC power or lighting requirements. Housed or open models . . . available with wheelbarrow, buggy or trailer mounting. For operating a single tool or motor, or floodlight . . . or gangs of tools, groups of motors, or lighting entire areas. Easy to put in operation . . . economical to operate and maintain. Compact, portable, self-contained.

For complete details write for Bulletin 594.

MASTER VIBRATOR COMPANY

Dayton 1, Ohio • Distributors throughout United States and Canada

Products Include: Concrete Vibrators, Gas or Electric Surfacing Attachments, High Speed Tools • Vibratory Concrete Finishing Screeds • Rotary Concrete Floor Finishing Machines • Portable Gas Electric Generator Plants, 500 Watt to 17000 Watt, Voltage Regulators and Portable Mountings Optional • Master Flood and Shovel Lights • Electric or Gas Engine Driven Power Blow Hammers

Advertisers in this issue

(Continued from page 162)

LaPlant-Choate Mfg. Co., Inc. 32, 33
Laughlin Co., The Thomas 100
Lehigh Portland Cement Co. 107
Leschen & Sons Rope Co., A. 19
Le Roi Co. 146
Le Tourneau, Inc., R. G. 15
Lidgerwood Mfg. Co. 148
Lima Locomotive Works, Inc. 111
Link-Belt Speeder Corp. 41
Lone Star Cement Corp. 5
Lowell Wrench Co. 119
Lufkin Rule Co., The 110

Macmillan Petroleum Corp. 22
Macwhyte Co. 24
Maine Steel Co. 13
Mall Tool Co. 10
Master Vibrator Co. 160
McGraw-Hill Book Co., Inc. 150, 162
Mercer-Robinson Co., Inc. 156
Michigan Power Shovel Co. 37
Mine Safety Appliances Co. 116
Moretrench Corp. 35

Northwest Engineering Co. 11
Novo Engine Co. 144

Oakite Products, Inc. 114
Osgood Co., The 92
Owen Bucket Co., The 156

Parsons Co., The 158
Price Brothers Co. 27

Ransome Machinery Co. 43
Rodgers Hydraulic, Inc. 12
Rogers Bros. Corp. 148

Schramm, Inc. 17
Seaman Motors 121
Searchlight Section 162
Shell Oil Company 34
Shunk Manufacturing Co. 116
Sinclair Refining Co. 104
Sisalkraft Co., The 124
Snap-on Tools Corp. 134
Socony-Vacuum Oil Co., Inc. 139
Sonoco Products Co. 110
Southwest Welding & Mfg. Co. 36
Standard Oil Co. (California) 145
Standard Steel Works 6
Sterling Machinery Corp. 162
Sterling Wheelbarrow Co. 140
Syntron Company 118

Templeton, Kenly & Co. 136
Texas Company, The 14
Thermoid Company 151
Thew Shovel Co., The 18
Timken-Detroit Axle Co., The 96
Timken Roller Bearing Co., The ..... 4th Cover
Trackson Company 147
Trojan Powder Co. 135
Tyson Bearing Corp. 44

Union Iron Works, Inc. 122
Union Metal Mfg. Co., The 40
United States Steel Corp., Subsidiaries 103, 129
Universal Atlas Cement Corp. 129
Upson-Walton Co., The 42

Van Der Horst Corp. of America 30
Viber Company 120
Vulcan Iron Works 150

Wellman Co., The S. K. 137
Wellman Engineering Co., The 152
White Co., David 158
White Mfg. Co. 162
Whiteman Mfg. Co. 89
Wickwire Spencer Steel Co. 123
Williams & Co., J. H. 115
Wood Manufacturing Co. 23
Wood Shovel & Tool Co., The 143

ORDERS ACCEPTED NOW FOR POSTWAR DELIVERY

•

WRITE TODAY FOR DESCRIPTIVE BULLETIN

Use the Coupon . . .

KOEHRING COMPANY, Dept. R,
3026 West Concordia Ave.,
Milwaukee 10, Wisconsin.

Please send New 205 Shovel Bulletin

Firm Name

Individual Name Title

Street Address

City Zone State

KOEHRING HEAVY DUTY

ARMY E NAVY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

Advertisers in this issue

Adams Co., J. D. 91
Aircraft & Diesel Equip. Corp. 90
Alemite Div., Stewart-Warner Co. 157
Allis-Chalmers Mfg. Co. 82, 83
American Bosch Corp. 95
American Cable Division
American Chain & Cable Co., Inc. 3rd Cover
American Chain & Cable Co., Inc.
(American Cable Division) ..... 3rd Cover
American Hoist & Derrick Co. 125
American Manganese Steel Div.,
American Brake Shoe Co. 102
American Steel & Wire Co. 103
Armstrong Bros. Tool Co. 126
Athey Truss Wheel Co. 133
Atlas Powder Co. 112
Austin-Western Company 20, 21

Baker Mfg. Co., The 25
Barber-Greene Co. 16
Barco Mfg. Co., Not Inc. 127
Bay City Shovels, Inc. 99
Beaver Pipe Tools, Inc. 108
Bethlehem Steel Co. 113
Briggs & Stratton Corp. 154
Broderick & Bascom Rope Co. 131
Bucyrus-Erie Co. 26, 155
Byers Machine Co., The 100, 128

Carver Pump Co., The 142
Caterpillar Tractor Co. 132
C. H. & E. Mfg. Co. 110
Chain Belt Company 93
Cleveland Rock Drill Co., The 39
Cleveland Trencher Co., The 152
Clyde Iron Works, Inc. 45
Coffing Hoist Co. 138
Complete Machinery & Equip. Co., Inc. 162
Construction Machinery Co. 102
Cummins Engine Co. 159

Diamond Chain & Mfg. Co. 118
Dierks Lumber & Coal Co. 162
Dixie Cup Co. 122
Dixon Valve & Coupling Co. 128
Duff-Norton Mfg. Co., The 106

Electric Tamper & Equipment Co. 128
Euclid Road Machinery Co., The 7

Galion Iron Works & Mfg. Co., The 98
Gar Wood Industries, Inc. 117
Gardner-Denver Co. 130
General Excavator Co., The 92
Goodrich Co., B. F. 9
Goodyear Tire & Rubber Co. 46
Gorman-Rupp Co. 106
Griffin Equipment Corp. 136
Griffin Wellpoint Corp. 126
Gulf Refining Co. 58

Haiss Mfg. Co., Inc., Geo. 140
Harnischfeger Corp. 105
Heil Company, The 94, 141
Hetherington & Berner, Inc. 160
Hooper & Sons Co., Wm. E. 101
Huber Mfg. Co., The 149

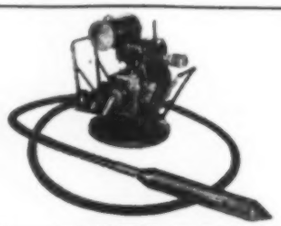
Independent Pneumatic Tool Co. 109
Ingersoll-Rand Co. 28, 29
Inland Steel Co. ..... 2nd Cover
Insley Mfg. Corp. 114
Iowa Manufacturing Co. 97
Isaacson Iron Works 153

Jaeger Machine Co., The 31
Johnson Company, The C. S. 138

Kiekhaefer Corp. 8
Koehring Company, The 161

WHERE TO BUY

COMPLETE
WELL POINT SYSTEMS
WILL DRY UP ANY EXCAVATION
Faster—More Economically
Write For Job Estimate and 32 page Catalog
COMPLETE
MACHINERY & EQUIPMENT CO., Inc.
36-36 11th St., Long Island City, N. Y.
Tel. IRonsides 6-8600
Branch: Third Avenue & Adams St., Gary, Indiana
Telephone: Gary 23963



Concrete VIBRATORS and Grinders
Write for Circular on types, sizes and prices
White Mfg. Co.
ELKHART INDIANA

STERLING PUMPS
STERLING QUALITY
CHOICE OF LEADING CONTRACTORS EVERYWHERE
SIMPLE
DEPENDABLE
RUGGED
WRITE NOW

STERLING MACHINERY CORPORATION
405 Southwest Blvd., Kansas City, Mo.

SEARCHLIGHT SECTION

WANTED

Speeder-Loader, crane or shovel, built on RD-6 Caterpillar Tractor. State location condition and price.

DIERKS LUMBER & COAL CO.
1006 Grand Ave. Kansas City, Missouri

How to design reinforced concrete structures

based on sound fundamentals and practical construction methods

Here is a thorough engineering treatment of the fundamental principles of design of reinforced concrete structures, giving an understanding of the nature and properties of concrete, explaining the fundamental theories of design, and demonstrating design procedure fully with detailed solutions of many actually existing practical structures.

Just Published!

The THEORY and PRACTICE of REINFORCED CONCRETE

By CLARENCE W. DUNHAM

Associate Professor of Civil Engineering, Yale University Consulting Structural Engineer for New York Engineering Office of the Anaconda Copper Mining Co., Second Edition, 558 pages, 5½ x 8½, 345 illustrations, $4.50.

This book covers the theory and practice needed to visualize how each part of a reinforced concrete structure acts, to design these parts so that each one will perform safely the service for which it is intended, and to plan the operations in the field so that the entire work will benefit.

Features of the new edition

—emphasis on simplified, approximate methods of analysis and design
—amplified treatment of bond, showing clearly the relation between bond stresses and the bending moments regardless of the shears and direct loads
—illustrative design of a typical beam-and-girder floor system, showing sketches of the reinforcement, arrangement of bars at the junction of continuous beams over a column, and approximate methods of determining where to stop or bend longitudinal reinforcement.
—treatment of combination columns and pipe columns filled with concrete
—practical suggestions for the construction of long retaining walls with varying heights
—useful material for the design of rectangular spread footings with direct loads and overturning moments

This book gives the engineer extremely practical material in examples of design problems and constructional data taken from actual structures such as the Lincoln Tunnel, The George Washington Bridge, the Bayonne Bridge, etc., with which the author has had close association.

Look up in this book

. . . the chapter by W. B. Sinnickson, Engineer of Tests, Port of New York Authority, covering concrete materials, together with a detailed explanation of the manufacture, treatment, and properties of concrete itself.

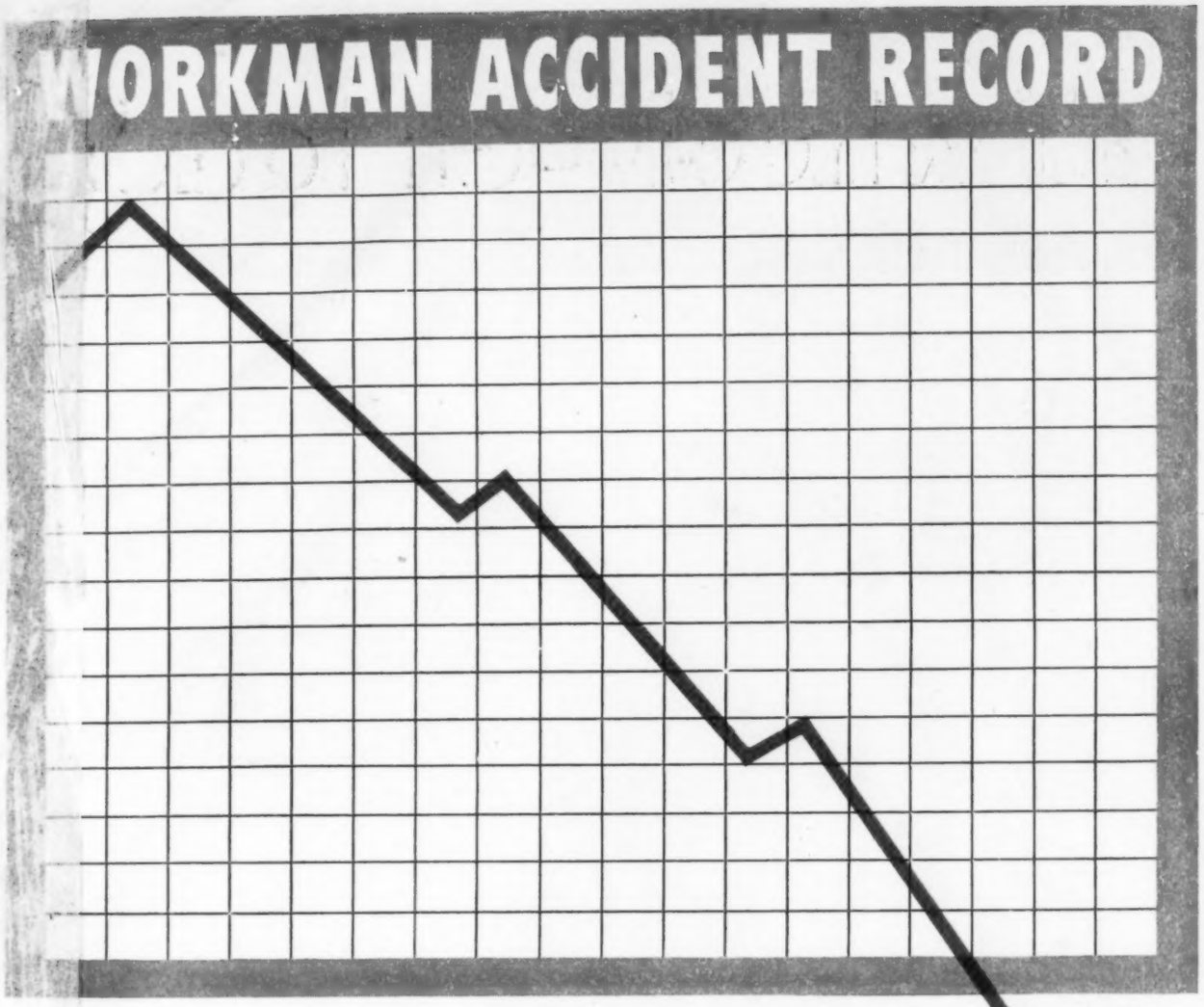
SEND THIS McGRAW-HILL COUPON

McGraw-Hill Book Co., 330 W. 42 St., N. Y. C. 18
Send me Dunham's Theory and Practice of Reinforced Concrete for 10 days' examination on approval. In 10 days I will send $4.50, plus a few cents postage, or return the book postpaid. (Postage paid on cash orders.)

Name .....
Address .....
City and State .....
Firm .....
Position ..... CM 12-44

(Books sent on approval in U. S. only)

WORKMAN ACCIDENT RECORD



JOE MUST HAVE SWITCHED TO *TRU-LAY PREFORMED WIRE ROPE!!*

(Yes — it's safer to handle)

AMERICAN CABLE DIVISION

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma

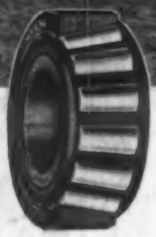
AMERICAN CHAIN & CABLE COMPANY, Inc.

BRIDGEPORT • CONNECTICUT

ARMY E NAVY

ESSENTIAL PRODUCTS...TRU-LAY Aircraft, Automotive, and Industrial Controls, TRU-LOC Aircraft Terminals, AMERICAN CABLE Wire Rope, TRU-STOP Brakes, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Castings, CAMPBELL Cutting Machines, FORD Hoists, Trolleys, HAZARD Wire Rope, MANLEY Auto Service Equipment, MARYLAND Bolts and Nuts, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Steel Castings, WRIGHT Hoists, Cranes . . . *In Business for Your Safety*

all wheels - all loads



ON TIMKEN BEARINGS

The Mississippi Wagon is a modern dirt-hauling unit produced by M-R-S Manufacturing Company, Jackson, Mississippi. It is a bottom-dump wagon of unusual design, and among the good features that contribute to its efficient, dependable and economical performance are Timken Tapered Roller Bearings in all wheels.

Besides relieving the wheels of frictional resistance and wear, Timken Bearings give them greater lateral stability; protect them against radial, thrust and combined loads; increase the endurance and lengthen the life of the entire unit.

Mississippi Wagons are manufactured in several models of various capacities. Model 75 shown in the photograph has a maximum payload capacity of 26,000 pounds.

When buying construction equipment of any kind be sure it is equipped with Timken Bearings; then you will be assured of maximum service now and for years to come. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS